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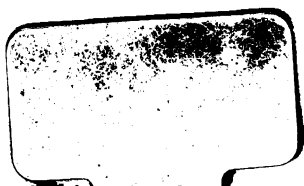
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THE APIARY

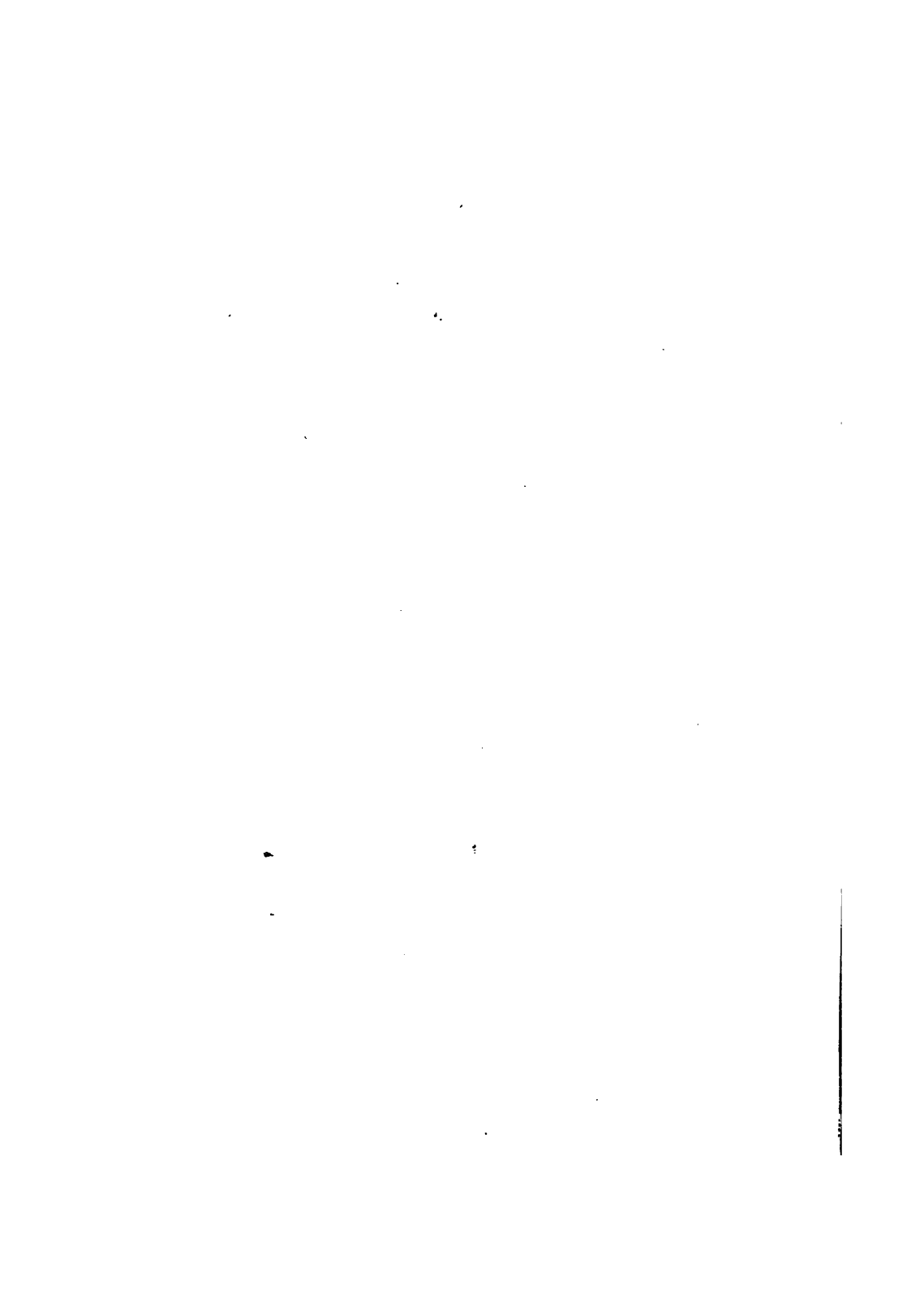


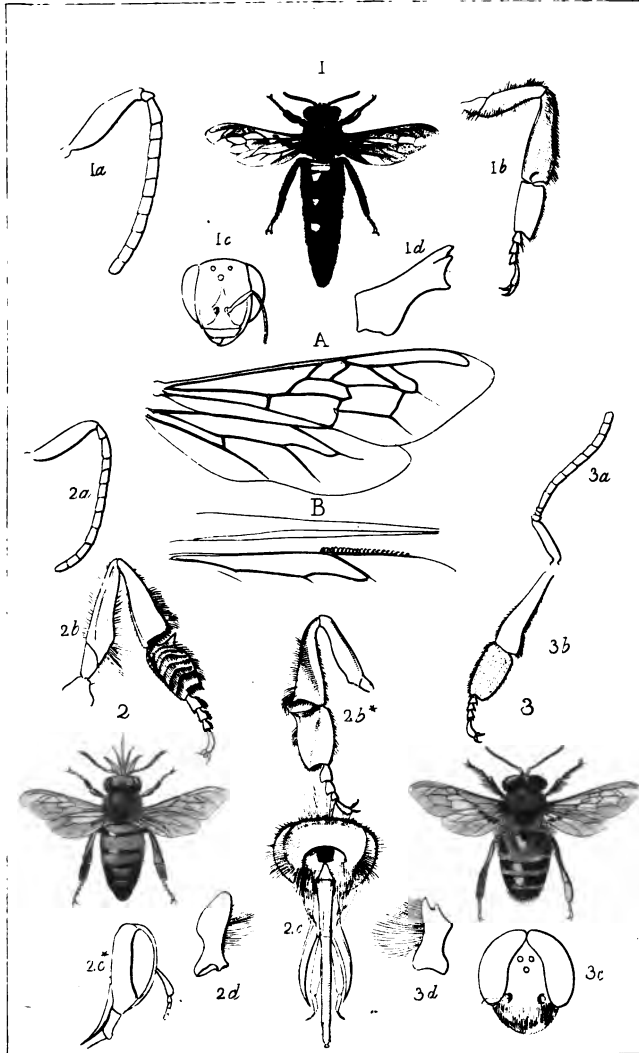
OR
BEES, BEE-HIVES
AND
BEE CULTURE



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THE APIARY;
OR,
BEES, BEE-HIVES, AND BEE-
CULTURE.

BEING A FAMILIAR ACCOUNT OF THE HABITS OF BEES AND THE
MOST IMPROVED METHODS OF MANAGEMENT, WITH FULL
DIRECTIONS, ADAPTED FOR THE COTTAGER, FARMER,
OR SCIENTIFIC APIARIAN.

BY ALFRED NEIGHBOUR.

"Beaucoup de gens aiment les abeilles: je n'ai vu personne qui les aime médiocrement:
on se passionne pour elles."—GELIEU.

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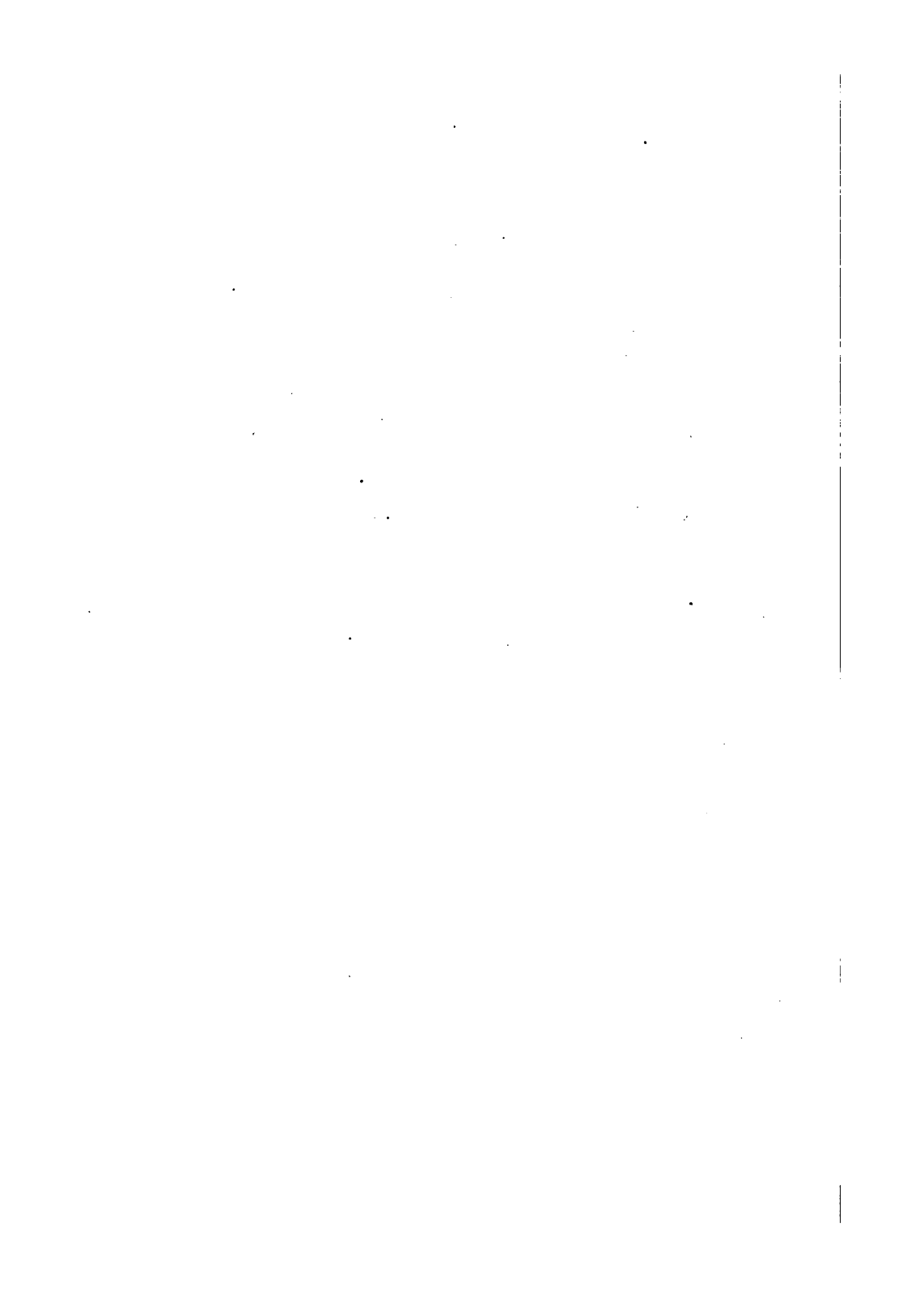


PREFACE TO THE SECOND EDITION.

IT is a source of much gratification to find that we are called upon to prepare another edition of this work in less than twelve months from its first publication.

No greater proof could have been afforded of the rapid advance which the pursuit of bee-keeping is now making in this country.

In the hope of rendering the present volume more useful and instructive than its predecessor, and also in acknowledgment of the kind approbation with which our earlier efforts have been received, we have made several additions, and trust that the same may prove acceptable to our readers.





PREFACE TO THE FIRST EDITION.

OUR apology for preparing a bee-book is a very simple one. We are so frequently applied to for advice on matters connected with bees and bee-hives, that it seemed likely to prove a great advantage, alike to our correspondents and ourselves, if we could point to a "handy book" of our own, which should contain full and detailed replies sufficient to meet all ordinary inquiries. Most of the apiarian manuals possess some special excellence or other, and we have no wish to disparage any of them; yet, in all, we have found a want of explanations relating to several of the more recent improvements.

It has more especially been our aim to give explicit and detailed directions on most subjects connected with

the hiving and removing of bees, and also, to show how, by judicious application of the "depriving" system, the productive powers of the bees may be enormously increased.

We need say little here as to the interest that attaches to the apiary as a source of perennial pleasure for the amateur naturalist. Many of the hives and methods of management are described with a direct reference to this class of bee-keepers, so that, besides plain and simple directions suitable for cottagers with their ordinary hives, this work will be found to include instructions useful for the scientific apiarian, or, at least, valuable, for those who desire to gain a much wider acquaintance with the secrets of bee-keeping than is now usually possessed. We would lay stress on the term "acquaintance," for there is nothing in the management of the various bar-and-frame hives which is at all difficult when frequent practice has rendered the bee-keeper familiar with them. Such explicit directions are herein given as to how the right operations may be performed at the right times, that a novice may at once commence to use the modern hives. The word "new-fangled" has done good service for the indolent and prejudiced, but we trust that our readers will be of a very different class.

Let them give a fair trial to the modern appliances for the humane and depriving system of bee-keeping, and they will find offered to them an entirely new field of interest and observation. At present, our continental neighbours far surpass us as bee-masters; but we trust that the following season, if the summer be fine, will prove a turning point in the course of English bee-keeping. There is little doubt that a greater number of intelligent and influential persons in this country will become bee-keepers than has ever been the case before.

Our task would have lost half its interest, did we not hope that it would result in something beyond the encouragement of a refined and interesting amusement for the leisurely classes. The social importance of bee-keeping, as a source of pecuniary profit for small farmers and agricultural labourers, has never been appreciated as it deserves. Yet these persons will not, of themselves, lay aside the bungling and wasteful plan of destroying the bees, or learn without being taught the only proper method, that of deprivation. Their educated neighbours, when once interested in bee-keeping, will be the persons to introduce the more profitable system of humane bee-keeping. The clergy especially, as permanent residents in the country, may have great

influence in this respect. There is not a rural or suburban parish in the kingdom in which bee-keeping might not be largely extended, and the well-being of all but the very poorest inhabitants would be greatly promoted. Not only would the general practice of bee-keeping add largely to the national resources, but that addition would chiefly fall to the share of those classes to whom it would be of most value. Moreover, in the course of thus adding to their income, the uneducated classes would become interested in an elevating and instructive pursuit.

It is curious to observe that honey, whether regarded as a manufactured article or as an agricultural product, is obtained under economical conditions of exceptional advantage. If regarded as a manufactured article, we notice that there is no outlay required for "labour," nor any expense for "raw material." The industrious labourers are eager to utilize all their strength: they never "combine" except for the benefit of their master, they never "strike" for wages, and they provide their own subsistence. All that the master-manufacturer of honey has to do financially is, to make a little outlay for "fixed capital" in the needful "plant of hives" and utensils—no "floating capital" is needed. Then,

on the other hand, if we regard honey as an agricultural product, it presents as such a still more striking contrast to the economists' theory of what are the "requisites of production." Not only is there no outlay needed for wages, and none for raw material, but there is nothing to be paid for "use of a natural agent." Every square yard of land in the United Kingdom may come to be cultivated, as in China, but no proprietor will ever be able to claim "rent" for those "waste products" of the flowers and leaves which none but the winged workers of the hive can ever utilize.

The recent domestication in England of the Ligurian or "Italian Alp" bee adds a new and additional source of interest to bee-culture. We have, therefore, gone pretty fully into this part of the subject; and believe that what is here published with regard to their introduction embodies the most recent and reliable information respecting them that is possessed by English apiarians.*

* Some of our apiarian friends may be inclined to be discouraged from cultivating the Ligurian bees in consequence of the liability to their becoming hybridised when located in proximity to the black bees. We can dispel these fears by stating that we have not unfrequently found that hybrid queens possess

We are under many obligations for the advice and assistance that we have on many occasions received from Mr. T. W. Woodbury, of Exeter, whose apiarian skill is unrivalled in this country. Our acknowledgments are also due to Mr. Henry Taylor, author of an excellent "Bee-keeper's Manual," for his help and counsel during the earlier years of our apiarian experience. Both the before-mentioned gentlemen have frequently communicated to us their contrivances and suggestions, without thought of fee or reward for them. In common with most recent writers on bee-culture, we are necessarily largely indebted to the standard works of Huber and succeeding apiarians. From the more recent volume of the Rev. L. L. Langstroth we have also obtained useful information. But having ourselves, of later years, had considerable experience in the manipulation and practical management of bees, we are enabled to confirm or qualify the statement of others; as well as to summarize information gleaned from many various sources.

Let it be understood, that we have no *patented devices*

the surprising fecundity of the genuine Italian ones, whilst the English stocks in course of time become strengthened by the infusion of foreign blood.

to push : we are free to choose out of the many apiarian contrivances that have been offered of late years, and we feel perfectly at liberty to praise or blame as our experience warrants us in doing. It does not follow that we necessarily disparage hives which are not described herein ; we have sought, as much as possible, to indicate the *principles* on which *good hives* must be constructed, whatever their outward size or shape. All through the work, we have endeavoured to adopt the golden rule of "submission to Nature" by reference to which all the fancied difficulties of bee-keeping may be easily overcome. In none of the attempts of men to hold sway over natural objects is the truth of Bacon's leading doctrine more beautifully illustrated than in the power that the apiarian exercises in the little world of bees.

Some persons may consider we have used too many poetical quotations in a book dealing wholly with matters of fact. We trust, however, that the examination of the extracts will at once remove that feeling of objection.

We venture to hope that the following pages contain many valuable hints and interesting statements which may tend to excite increased and renewed attention to the most useful and industrious of all insects.

Although bees have neither reason nor religion for their guide, yet from them man may learn many a lesson of virtue and industry, and may even draw from them thoughts suggestive of trust and faith in God.

We beg leave to conclude our preface, and introduce the subject, by the following extract from Shakspeare, who, without doubt, kept bees in that garden at Stratford wherein he used to meditate :—

“ So work the honey-bees ;
 Creatures that, by a rule in Nature, teach
 The art of order to a peopled kingdom.
 They have a king and officers of sorts ;
 Where some, like magistrates, correct at home ;
 Others, like merchants, venture trade abroad ;
 Others, like soldiers, armèd in their stings,
 Make boot upon the Summer's velvet buds,
 Which pillage they, with merry march, bring home
 To the tent royal of their emperor :
 Who, busied in his majesty, surveys
 The singing masons building roofs of gold ;
 The civil citizens kneading up the honey ;
 The poor mechanic porters crowding in
 Their heavy burdens at his narrow gate ;
 The sad-eyed justice, with his surly hum,
 Delivering o'er to executors pale
 The lazy, yawning drone.”

SHAKSPEARE'S *Henry V.*, Act 1., Scene 2.



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ERRATUM.

At eleventh line from bottom of page 111, for “ three,” read
“ those.”

DESCRIPTION OF PLATES.

PLATE I.—(FRONTISPIECE.)

1. Queen-Bee.
 - 1*a*. Antenna of ditto.
 - 1*b*. Hind leg of ditto.
 - 1*c*. Front view of head of ditto.
 - 1*d*. Mandible of ditto.
2. Worker, or imperfect female.
 - 2*a*. Antenna of ditto.
 - 2*b*. Hind leg of ditto, inner side showing the pollen-brushes.
 - 2*b**. Ditto, outer side showing the pollen-basket.
 - 2*c**. Side view of head.
 - 2*c*. Back view of ditto, showing the junction of the gullet with the thorax, and position of the tongue and its appendages.
 - 2*d*. Mandible.
3. Male, or drone.
 - 3*a*. Antenna of ditto.
 - 3*b*. Hind leg of ditto.
 - 3*c*. Front view of head of ditto.
 - 3*d*. Mandible of ditto
- A. Enlarged view of the wing. B. Hind edge of fore wing showing the thickened margin, and fore edge of hind wing, showing the hooks, which hold on to the thickened margin of the fore wing and keep them together during flight.

PLATE II.—PAGE 31.

1. Body of a bee divested of antennæ, legs, and wings, showing the anatomy of the thorax and natural position of the stomach.
- 5*. The eyes.
- a. The ocelli.
- bbb. The muscles that move the wings.
- c. The external covering of the thorax.
- ee. The bases of the wings.
- d. The honey-bag, or first stomach.
- f. The ventricle, or true stomach, distended with food.
- g. The rectum.
- h. The biliary vessels.
- i. Portion of the membranous tissue lining the inner surface of the segments, and enclosing the stomach and intestines.
- q. The stomach emptied of its contents, to show the muscular contraction of the ventricle.
- d. The honey-bag.
- f. The ventricle.
- g. The rectum.
- h. The biliary vessels.
- i. The ligula, or tongue, and its appendages.
- l. The base of the ligula.
- m. Maxillary palpi.
- n. The maxilla.
- o. The labial palpi.
- p. The tongue.
4. The sting and its muscles.

- g. The attachment of the muscles to the outer covering of the abdomen.
 - r. Muscles that move the sting.
 - s. Curved base of the sheaths that enclose the sting.
 - t. Poison-bag.
 - u. Glands connected with the poison-bag.
 - v. Honey-plates covering the muscles r, and to which the sheaths of the stings are attached at s.
 - ** Base of sting connecting with the poison-bag t.
 - 4*. Magnified view of point of sting, showing the serrations on each side.
 - 5. Three hexagonal prisms of a bee's eye (Swammerdam).
 - 6. Abdominal plates of the bee, detached to show the wax-cells.
 - 7. Eggs of bee, natural size, and magnified (from Reaumur)
 - 8. Helminthimorphous, or apodal larva of a bee (Reaumur).
-



THE APIARY;

OR,

BEEES, BEE-HIVES, & BEE-CULTURE.

THERE are two classes of persons for whom bee-culture should have a strong interest, and two distinct purposes for which the pursuit may be followed. First, there is the cottager or small farmer, who, in thousands of instances, might add considerably to his income by bee-keeping ; and, secondly, there is the man of "retired leisure" and refinement, who, in the personal tendance of an apiary, would find an easy and interesting occupation, and one which could not fail to quicken his faculties of general scientific observation. Moreover, in contemplating the wonderful skill, industry, and prevision of his insect-artizans, the bee-keeper would find in his apiary constant illustrations of creative wisdom.

Amongst the humbler classes in the rural districts, the neglect of bee-keeping is to be attributed to an exag-

gerated idea of the trouble needful for the care of a few hives, and also to ignorance of the easier and more profitable methods of modern management. Many of the wealthier country or suburban residents, also, are averse to the personal trouble which they fancy needful in keeping an apiary; and, perhaps, some gentlemen are more afraid than they would like to own of that very efficient weapon of defence with which the honey bee is provided. But the prejudices against bees are quite unnecessary; bees are as tractable as they are intelligent, and it is the purpose of this little book to show that bee-culture is an easy and safe, as well as a deeply interesting, pursuit. Possibly, also, some who do us the favour to read our detailed explanations will see how the rural clergyman, or the benevolent landlord, who keeps an apiary of his own, may be of signal service to his poorer neighbours in explaining to them the mysteries of bee-keeping.





I.—NATURAL HISTORY OF THE INHABITANTS OF THE HIVE.

EVERY hive or bee colony comprises in summer three distinct classes of bees, each class having functions peculiar to itself, and which are essential to the well-being of the whole community. As each bee knows its own proper duties, they all work harmoniously and zealously together, for the common weal. Certain apparent exceptions to the good-fellowship of the bees will be hereafter noticed, but those arise out of essential conditions in the social economy of the bee community. That *honey bees* should live in society, as they do in hives, is absolutely needful. A bee, in an isolated condition, is a very helpless, delicate little creature, soon susceptible of cold, and paralysed thereby, unless able to join her companions before night comes on. By congregating in large numbers, bees maintain warmth, whatever the external temperature may be.

The three classes of bees are :—the queen-bee, with the pupæ or embryos intended for queens ; the working bees ; and the drones, or male bees.

THE QUEEN.

Appropriately styled, by German bee-keepers, the mother-bee, is the only perfectly developed female among the whole population of each separate colony. Thus her majesty indisputably sways her sceptre by a divine right, because she lives and reigns in the hearts of loving children and subjects.

Dr. Evans* introduces the queen-bee to our notice thus :—

“ First of the throng, and foremost of the whole,
One ‘ stands confest the sovereign and the soul.’ ”

The queen may very readily be distinguished from the rest of the bees by the greater length of her body and the comparative shortness of her wings ; her legs are longer, and are not furnished with either brushes or baskets as those of the working bee, for, being constantly fed by the latter, she does not need those implements ; the upper surface of her body is of a brighter black than

* Dr. Evans—who may be styled the poet-laureate of the bees—lived at Shrewsbury, where he practised as a physician. His poem on bees is written with great taste and careful elaboration, and it describes the habits of bees with a degree of accuracy only attainable after continuous scientific observation.

the other bees, whilst her colour underneath is a yellowish brown ;* her wings, which do not extend more than half the length of her body, are sinewy and strong ; her long abdomen tapers nearly to a point ; her head is rounder, her tongue more slender, and not nearly so long, as that of the working bee, and her sting is curved. Her movements are measured and majestic ; as she moves in the hive the other bees form a circle round her, none venturing to turn their backs upon her, but all anxious to show that respect and attention due to her rank and station. Whenever, in the exercise of her sovereign will, the queen wishes to travel amongst her subjects, she experiences no inconvenience from overcrowding ; although the part of the hive to which she is journeying may be the most populous, way is immediately made, the common bees tumbling over each other to get out of her path, so great is their anxiety not to interfere with the royal progress.

It is the chief function of the queen to lay the eggs from which all future bees originate, the multiplication of the species being the purpose of her existence ; and she follows it up with an assiduity similar to that with which the workers construct combs or collect honey. A queen is estimated to lay in the breeding season from 1,500 to 2,000 eggs a-day, and in the course of one year is supposed to produce more than 100,000 bees. This is

* Yellow Italian queens form an exception in point of colour. See frontispiece, fig. 1.

indeed a vast number ; but when there is taken into consideration the great number required for swarms, the constant lessening of their strength by death in various ways, and the many casualties attending them in their distant travels in search of the luscious store, it does not seem that the case is over-stated.

In a Glass Unicomb Hive,—which we shall hereinafter describe,—all the movements of the queen-bee may be traced ; she may be seen thrusting her head into a cell to discover whether it be occupied with an egg or honey, and if empty, she turns round in a dignified manner and inserts her long body—so long, that she is able to deposit the egg at the bottom of the cell ; she then passes on to another, and so continues industriously multiplying her laborious subjects. It not unfrequently happens when the queen is prolific, and if it be an early season, that many eggs are wasted for want of unoccupied cells ; for in that case the queen leaves them exposed at the bottom of the hive, when they are greedily devoured by the bees.

The queen-bee, unlike the great majority of her subjects, is a stayer at home ; generally speaking, she only quits the hive twice in her life. The first occasion is on the all-important day of her marriage, which always takes place at a great height in the air, and generally on the second or third day of her princess-life ; she never afterwards leaves the hive, except to lead off an emigrating swarm. Evans, with proper loyalty, has

duly furnished a glowing epithalamium for the queen-bee :—thus,

“ When noon-tide Sirius glares on high,
Young love ascends the glowing sky,
From vein to vein swift shoots prolific fire,
And thrills each insect fibre with desire ;
Then Nature, to fulfil thy prime decree,
Wheels round, in wanton rings, the courtier Bee ;
Now shyly distant, now with bolder air,
He woos and wins the all-complying fair ;
Through fields of ether, veiled in vap’ry gloom
They seek, with amorous haste, the nuptial room ;
As erst the immortal pair, on Ida’s height,
Wreath’d round their noon of joy ambrosial night.”

The loyalty and attachment of bees to their queen is one of their most remarkable characteristics ; they constantly supply her with food, and fawn upon and caress her, softly touching her with their antennæ—a favour which she occasionally returns. When she moves about the hive, all the bees through whom she successively passes pay her the same homage ; those whom she leaves behind in her track close together, and resume their accustomed occupations.

The majestic deportment of the queen-bee and the homage paid to her is, with a little poetic licence, thus described by Evans :—

“ But mark, of royal port and awful mien,
Where moves with measured pace the insect Queen !
Twelve chosen guards, with slow and solemn gait,
Bend at her nod, and round her person wait.”

This homage is, however, only paid to matron queens. Whilst they continue princesses, they receive no distinctive marks of respect. Dr. Dunbar, the noted Scotch apiarian, observed a very striking instance of this whilst experimenting on the combative qualities of the queen-bee "So long," says he, "as the queen which survived the rencontre with her rival remained a virgin, not the slightest degree of respect or attention was paid her; not a single bee gave her food; she was obliged, as often as she required it, to help herself; and in crossing the honey cells for that purpose, she had to scramble, often with difficulty, over the crowd, not an individual of which got out of her way, or seemed to care whether she fed or starved: but no sooner did she become a mother, than the scene was changed, and all testified towards her that most affectionate attention, which is uniformly exhibited to fertile queens."

The queen-bee, though provided with a sting, never uses it on any account, except in combat with her sister-queens. But she admits of no rival to her throne; almost her first act, on coming forth from the cell, is an attempt to tear open and destroy the cells containing the pupæ of princesses likely to become competitors. Should it so happen that another queen of similar age does exist in the hive at the same time, the two are speedily brought into contact with each other, in order to fight it out and decide by a struggle, mortal to one of them, which is to be the ruler;—the stronger of course is victorious, and

remains supreme. This, it must be admitted, is a wiser method of settling the affair than it would be to range the whole hive under two distinct banners, and so create a civil war, in which the members of the rival bands would kill and destroy each other for matters they individually have little or no concern about : for the bees care not which queen it is, so long as they are certain of having one to rule over them and perpetuate the community.

After perusing the description given above of the attachment of bees to their queen, it may be easy to imagine the consternation a hive is thrown into when deprived of her presence. The bees first make a diligent search for their monarch in the hive, and then afterwards rush forth in immense numbers to seek her. When such a commotion is observed in an apiary, the experienced bee-master will repair the loss by giving a queen : the bees have generally their own remedy for such a calamity, in their power of raising a new queen from amongst their larvæ ; but if neither of these means be available, the whole colony dwindles and dies. The following is the method by which working bees provide a successor to the throne when deprived of their queen by accident, or in anticipation of the first swarm, which is always led by the old queen :—

They select, when not more than three days old, an egg or grub previously intended for a worker-bee, and then enlarge the cell so selected by destroying the surrounding partitions ; they thus form a royal cradle, in shape

very much like an acorn cup inverted. The chosen embryo is then fed liberally with a peculiar description of nurture, called by naturalists "royal jelly"—a pungent food, prepared by the working bees exclusively for those of the larvæ that are destined to become candidates for the honour of royalty. Should a queen be forcibly separated from her subjects, she resents the interference, refuses food, pines, and dies.

The whole natural history of the queen-bee is in itself a subject that will well repay for continuous study. Those who desire to follow it, we would refer to the complete works of HUBER—the greatest of apiarians,—SWAMMERDAM, BEVAN, LANGSTROTH, &c. The observations upon the queen-bee needful to verify the above-mentioned facts can only be made in hives constructed for the purpose, of which the "Unicomb Observatory Hive" is the best. In ordinary hives the queen is scarcely ever to be seen; where there are several rows of comb, she invariably keeps between them, both for warmth and to be more secure from danger. The writer has frequently observed in stocks which have unfortunately died, that the queen was one of the last to expire; and she is always more difficult to gain possession of than other bees, being by instinct taught that she is indispensable to the welfare of her subjects.

The queen enjoys a far longer life than any of her subjects, her age generally extending to four, or even five years. The drones, which are mostly hatched in the

early spring, seldom live more than three or four months, even if they should escape the sting of the executioner, to which they generally fall victims. The worker-bee, it is now a well-ascertained fact, lives from six to eight months, in no case exceeding the latter ; so that we may reckon that the bees hatched in April and May expire about the end of the year ; and it is those of the autumn who carry on the duties of the hive until the spring and summer, that being the time when the greatest number of eggs are laid. The population of a hive is very small during the winter, in comparison with the vast numbers gathering produce in the summer,—produce which they themselves live to enjoy but for a short period. So that not only, as of old, may lessons of industry be learned from bees, but they also teach self-denial to mankind, since they labour for the community rather than for themselves. Evans, in describing the age of bees, thus paraphrases the well known couplet of Homer, in allusion to the fleeting generations of men :—

“ Like leaves on trees the race of bees is found,
Now green in youth, now withering on the ground ;
Another race the spring or fall supplies,
They droop successive, and successive rise.”

THE DRONE.

The drones are male bees ; they possess no sting, are more hairy and larger than the common bee, and may

be easily distinguished by their heavy motion, thick-set form, and louder humming. Evans thus describes the drones :—

“ Their short proboscis sips
No luscious nectar from the wild thyme’s lips ;
From the lime leaf no amber drops they steal,
Nor bear their grooveless thighs the foodful meal :
On others’ toils, in pampered leisure, thrive
The lazy fathers of the industrious hive ;
Yet oft, we’re told, these seeming idlers share
The pleasing duties of parental care ;
With fond attention guard each genial cell,
And watch the embryo bursting from the shell.”

But Dr. Evans had been “told” what was not correct when he sought to dignify drones with the office of “nursing fathers,”—that task is undertaken by the younger of the working bees. No occupation falls to the lot of the drones in gathering honey, nor have they the means provided them by Nature for assisting in the labours of the hive. The drones are the progenitors of working bees, and nothing more ; so far as is known, that is the only purpose of their short existence.

In a well-populated hive the number of drones is computed at from one to two thousand. “Naturalists,” says Huber, “have been extremely embarrassed to account for the number of males in most hives, and which seem only a burden to the community, since they appear to fulfil no function. But we now begin to discern the object

of Nature in multiplying them to such an extent. As fecundation cannot be accomplished within the hive, and as the queen is obliged to traverse the expanse of the atmosphere, it is requisite that the males should be numerous, that she may have the chance of meeting some one of them in her flight. Were only two or three in each hive, there would be little probability of their departure at the same instant with the queen, or that they would meet her in their excursions; and most of the females might thus remain sterile." It is important for the safety of the queen-bee that her stay in the air should be as brief as possible: her large size and slowness of flight render her an easy prey to birds. It is not now thought that the queen always pairs with a drone of the *same* hive, as Huber seems to have supposed. The drone that happens to be the selected husband is by no means so fortunate as at first sight may appear, for it is a law of nature that the bridegroom does not survive the wedding-day. Her majesty, although thus left a widowed, is by no means a sorrowful, bride, for she soon becomes the happy mother of a large family. It cannot be said that she pays no respect to the memory of her departed lord, for she never marries again. Once impregnated,—as is the case with most insects,—the queen-bee continues productive during the remainder of her existence. It has, however, been found that though old queens cease to lay worker eggs, they may continue to lay those of drones. The swarming season being

over,—that is about the end of July,—a general massacre of the “lazy fathers” takes place. Dr. Bevan, in the “Honey Bee,” observes on this point: “The work of the drones being now completed, they are regarded as useless consumers of the fruits of others’ labour; love is at once converted into hate, and a general proscription takes place. The unfortunate victims evidently perceive their danger, for they are never at this time seen resting in one place, but darting in and out of the hive with the utmost precipitation, as if in fear of being seized.”

Their destruction is thought, by some, to be caused by their being harassed until they quit the hive; but Huber says he ascertained that the death of the drones was caused by the stings of the workers. Supposing the drones come forth in May, which is the average period of their being hatched, their destruction takes place somewhere about the commencement of August, so that three months is the usual extent of their existence; but should it so happen that the usual development of the queen has been retarded, or that the hive has by chance been deprived of her, the massacre of the drones is deferred. In any case, the natural term of the life of drone-bees does not exceed four months, so that they are all dead before the winter, and are not allowed to be useless consumers of the general store.

THE WORKER-BEE.

The working bees form, by far, the most numerous class of the three kinds contained in the hive, and least of all require description. They are the smallest of the bees, are dark brown in colour, or nearly black,* and much more active on the wing than are either drones or queens. The usual number in a healthy hive varies from twelve to thirty thousand; and, previous to swarming, exceeds the larger number. The worker-bee is of the same sex as the queen, but is only partially developed. Any egg of a worker-bee—by the cell being enlarged, as already described, and the “royal jelly” being supplied to the larva—may be hatched into a mature and perfect queen. This, one of the most curious facts connected with the natural history of bees, may be verified in any apiary by most interesting experiments, which may be turned to important use. With regard to the supposed distinctions between “nursing” and working bees, it is now agreed that it only consists in a division of labour, the young workers staying at home to feed the larvæ until they are themselves vigorous enough to range the fields in quest of supplies. But, for many details of unfailing interest, we must again refer

* Italian workers form an exception in point of colour. See Plate I., fig. 2.

our readers to the standard works on bees that have already been named.

THE EGGS OF BEES.

It is necessary that some explanation should be given as to the existence of the bee before it emerges from the cell.

The eggs (Plate II., fig. 7) of all the three kinds of bees, when first deposited, are of an oval shape, and of a pearly-white colour. In four or five days the egg changes to a worm, and in this stage is known by the names of larva or grub (Plate II., fig. 8), in which state it remains four to six days more. During this period it is fed by the nurse-bees with a mixture of farina and honey, a constant supply of which is given to it. The next transformation is to the nymph or pupa form. The nurse-bees now seal up the cells with a preparation similar to wax, and then the pupa spins round itself a film or cocoon, just as a silkworm does in its chrysalis state. The microscope shows that this cradle-curtain is perforated with very minute holes, through which the baby-bee is duly supplied with air. No further attention on the part of the bees is now requisite, except a proper degree of heat, which they take care to keep up—a position for the breeding cells being selected in the centre of the hive, where the temperature is likely to be most congenial.

Twenty-one days after the egg is first laid (unless cold weather should have retarded it) the bee quits the pupa state, and, nibbling its way through the waxen covering that has enclosed it, comes forth a winged insect. The eggs of drones require twenty-four days, and those of queens sixteen days, to arrive at maturity, and are hatched in warm summer weather, a higher temperature being necessary. In the Unicomb Observatory Hives, the young bees may distinctly be seen as they literally fight their way into the world, for the other bees do not take the slightest notice, nor afford them any assistance. We have frequently been amused in watching the eager little new-comer, now obtruding its head, and anon compelled to withdraw into the cell to escape being trampled on by the apparently unfeeling throng, until at last it has succeeded in making its exit. The little grey creature, after brushing and shaking itself, enters upon its duties in the hive, such as the nursing before alluded to, or secreting wax, and in (say) a week issues forth to the more laborious occupation of gathering honey in the fields—thus early illustrating that character for industry which has been proverbial at least since the days of Aristotle, and which has in our day been rendered familiar even to infant minds through the nursery rhymes of Dr. Watts.

INCREASE OF BEES.

Every one is familiar with the natural process of "swarming," by which bees provide themselves with fresh space, and seek to plant colonies to absorb their increase of population. But the object of the bee-master is to train and educate his bees, and in so doing he avoids much of the risk and trouble which is incurred by allowing the busy folk to follow their own devices. The various methods for this end adopted by apiarians all come under the term of the "depriving" system, and they form part of the great object of humane and economical bee-keeping, which is to save the bees alive instead of slaughtering them, as under the old clumsy system. A very natural question is often asked : —How is it that, upon the depriving system, where our object is to prevent swarming, the increase of numbers is not so great as upon the old plan? It will be seen that the laying of eggs is performed by the queen only, and that there is but one queen to each hive; so that where swarming is prevented, there remains only one hive or stock, as the superfluous princesses are not allowed to come to maturity. If all those princesses were to become monarchs, or mother-bees, and to emigrate with a proportionate number of workers, increase would be going on more rapidly; but the old stock would be so impoverished thereby as possibly to yield no surplus

honey, whilst the swarms might come off too late for them to collect sufficient store whereon to grow populous enough to withstand the winter.

With bees, as with men, "union is strength;" and it is often better to induce them to remain as one family, rather than to part numbers at a late period of the honey-gathering season, without a prospect of supporting themselves, and so perish from cold and hunger during the ordeal of the winter season. Would it not in such cases have been better for the little folk to have kept under one roof through the winter, and to have been able to take full advantage of the following early spring? This is one of the great secrets of successful bee-keeping.

Our plan of giving additional store-room will, generally speaking, prevent swarming. This stay-at-home policy, we contend, is an advantage; for instead of the loss of time consequent upon a swarm hanging out preparatory to flight, all the bees are engaged in collecting honey, and that at a time when the weather is most favourable and the food most abundant. Upon the old system, the swarm leaves the hive simply because the dwelling has not been enlarged at the time when the bees are increasing. The emigrants are always led off by the old queen, leaving either young or embryo queens to lead off after-swarms, and to furnish a mistress for the old stock, and carry on the multiplication of the species. Upon the antiquated and inhuman plan, where

so great a destruction takes place by the brimstone match, breeding must, of course, be allowed to go on to its full extent to make up for such sacrifices. Our chief object under the new system is to obtain honey free from all extraneous matter. Pure honey cannot be gathered from combs where storing and breeding are performed in the same compartment. For fuller explanations on this point, we refer to the various descriptions of our improved hives in a subsequent section of this work.

There can now be scarcely two opinions as to the uselessness of the rustic plan of immolating the poor bees after they have striven through the summer so to "improve each shining hour." The ancients in Greece and Italy took the surplus honey and spared the bees, and now for every intelligent bee-keeper there are ample appliances wherewith to attain the same results. Mr. Langstroth quotes from the German the following epitaph, which, he says, "might be properly placed over every pit of brimstoned bees":—

Here Rests,
CUT OFF FROM USEFUL LABOUR,
A COLONY OF
INDUSTRIOUS BEES,
BASELY MURDERED
BY ITS
UNGRATEFUL AND IGNORANT
OWNER.

And Thomson, the poet of "The Seasons," has recorded an eloquent poetic protest against the barbarous practice, for which, however, in his day there was no alternative:—

" Ah ! see where, robbed and murdered in that pit,
Lies the still-heaving hive ! at evening snatched,
Beneath the cloud of guilt-concealing night,
And fix'd o'er sulphur ! while, not dreaming ill,
The happy people, in their waxen cells,
Sat tending public cares.
Sudden, the dark, oppressive steam ascends,
And, used to milder scents, the tender race
By thousands tumble from their honied dome,
Into a gulf of blue sulphureous flame !"

It will be our pleasing task, in subsequent chapters, to show " a more excellent way."

SWARMING.

The spring is the best period at which to commence an apiary, and swarming-time is a good starting-point for the new bee-keeper. The period known as the swarming season is during the months of May and June. With a very forward stock, and in exceedingly fine weather, bees do occasionally swarm in April. The earlier the swarm, the greater is its value. If bees swarm in July, they seldom gather sufficient to sustain

themselves through the winter, though by careful feeding they may easily be kept alive, if hived early in the month.

The cause of a swarm leaving the stock-hive is, that the population has grown too large for it. Swarming is a provision of Nature for remedying the inconvenience of overcrowding, and is the method whereby the bees seek for space in which to increase their stores. By putting on "super-hives," the required relief may, in many cases, be given to them; but should the multiplication of stocks be desired, the bee-keeper will defer increasing the space until the swarm has issued forth. In May, when the spring has been fine, the queen-bee is very active in laying eggs, and the increase in a strong, healthy hive is so prodigious that emigration is necessary, or the bees would cease to work.

It is now a well-established fact that the old queen goes forth with the first swarm, preparation having been made to supply her place as soon as the bees determine upon the necessity of a division of their commonwealth. Thus the sovereignty of the old hive, after the first swarm has issued, devolves upon a young queen.

As soon as the swarm builds combs in its new abode, the emigrant-queen, being impregnated and her ovaries full, begins laying eggs in the cells, and thereby speedily multiplies the labourers of the new colony. Although there is now amongst apiarians no doubt that the old queen quits her home, there is no rule as to the compo-

sition of the swarm : old and young alike depart. Some show unmistakeable signs of age by their ragged wings, others their extreme youth by their lighter colour ; how they determine which shall stay and which shall go has not yet been ascertained. In preparation for flight, bees commence filling their honey bags, taking sufficient, it is said, for three days' sustenance. This store is needful, not only for food, but to enable the bees to commence the secretion of wax and the building of combs in their new domicile.

On the day of emigration, the weather must be fine, warm, and clear, with but little wind stirring ; for the old queen, like a prudent matron, will not venture out unless the day is in every way favourable. Whilst her majesty hesitates, either for the reasons we have mentioned, or because the internal arrangements are not sufficiently matured, the bees will often fly about or hang in clusters at the entrance of the hive for two or three days and nights together, all labour meanwhile being suspended. The agitation of the little folk is well described by Evans :—

“ See where, with hurried step, the impassioned throng
Pace o'er the hive, and seem, with plaintive song,
T' invite the loitering queen ; now range the floor,
And hang in cluster'd columns from the door ;
Or now in restless rings around they fly,
Nor spoil thy sip, nor load the hollowed thigh ;
E'en the dull drone his wonted ease gives o'er,
Flaps his unwieldy wings, and longs to soar.”

But when all is ready, a scene of the most violent agitation takes place; the bees rush out in vast numbers, forming quite a dark cloud as they traverse the air.

The time selected for the departure of the emigrants is generally between 10 A.M. and 3 P.M.; most swarms come off within an hour of noon. It is a very general remark that bees choose a Sunday for swarming, and probably this is because then greater stillness reigns around. It will not be difficult to imagine that the careful bee-keeper is anxious to keep a strict watch, lest he should lose such a treasure when once it takes wing. The exciting scene at a bee-swarming has been well described by the apiarian laureate:—

“Up mounts the chief, and, to the cheated eye,
Ten thousand shuttles dart along the sky;
As swift through æther rise the rushing swarms,
Gay dancing to the beam their sunbright forms;
And each thin form, still lingering on the sight,
Trails, as it shoots, a line of silver light.
High poised on buoyant wing, the thoughtful queen,
In gaze attentive, views the varied scene,
And soon her far-fetched ken discerns below
The light laburnum lift her polished brow,
Wave her green leafy ringlets o’er the glade.
Swift as the falcon’s sweep the monarch bends
Her flight abrupt: the following host descends;
Round the fine twig, like clustered grapes they close
In thickening wreaths, and court a short repose.”

In many country districts it is a time-honoured custom

for the good folks of the village to commence on such occasions a terrible noise of tanging and ringing with frying-pan and key. This is done with the absurd notion that the bees are charmed with the clangorous din, and may by it be induced to settle as near as possible to the source of such sweet sounds. This is, however, quite a mistake: there are other and better means for the purpose. The practice of ringing was originally adopted for a different and far more sensible object—viz., for the purpose of giving notice that a swarm had issued forth, and that the owner was anxious to claim the right of following, even though it should alight on a neighbour's premises. It would be curious to trace how this ancient ceremony has thus got corrupted from the original design.

In case the bees do not speedily after swarming manifest signs of settling, a few handfuls of sand or loose mould may be thrown up in the air so as to fall among the winged throng; they mistake this for rain, and then very quickly determine upon settling. Some persons squirt a little water from a garden engine in order to produce the same effect.

There are, indeed, many ingenious devices used by apiarians for decoying the swarms. Mr. Langstroth mentions a plan of stringing dead bees together, and tying a bunch of them on any shrub or low tree upon which it is desirable that they should alight; another plan is, to hang some black woven material near the

hives, so that the swarming bees may be led to suppose they see another colony, to which they will hasten to attach themselves. Swarms have a great affinity for each other when they are adrift in the air; but, of course, when the union has been effected, the rival queens have to do battle for supremacy. A more ingenious device than any of the above is by means of a mirror, to flash a reflection of the sun's rays amongst a swarm, which bewilders the bees, and checks their flight. It is manifestly often desirable to use some of these endeavours to induce early settlement, and to prevent, if possible, the bees from clustering in high trees or under the eaves of houses, where it may be difficult to hive them.

Should prompt measures not be taken to hive the bees as soon as the cluster is well formed, there is danger of their starting on a second flight; and this is what the apiarian has so much to dread. If the bees set off a second time, it is generally for a long flight, often for miles, so that in such a case it is usually impossible to follow them, and consequently a valuable colony may be irretrievably lost.

Too much care cannot be exercised to prevent the sun's rays falling on a swarm when it has once settled. If exposed to heat in this way, bees are very likely to decamp. We have frequently stretched matting or sheeting on poles, so as to intercept the glare, and thus render their temporary position cool and comfortable.

Two swarms sometimes depart at the same time, and join together; in such a case, we recommend that they be treated as one, by putting them into a hive as before described, taking care to give abundant room and not to delay affording access to the super hive or glasses. They will settle their own notions of sovereignty by one queen destroying the other. There are means of separating two swarms, if done at the time; but the operation is a formidable one, and does not always repay even those most accustomed to such manipulation.

With regard to preparations for taking a swarm, our advice to the bee-keeper must be the reverse of Mrs. Glass's notable injunction as to the cooking of a hare. Some time before you expect to take a swarm, be sure to have a suitable hive in which to take it, and also every other requisite properly ready. Here we will explain what was said in the introduction as to the safety of moving and handling bees. A bee-veil or dress will preserve the most sensitive from the possibility of being stung. This article, which may be bought with the hives, is made of net close enough to exclude bees, but open enough for the operator's vision. It is made to go over the hat of a lady or cap of a gentleman; it closes round the waist, and has sleeves fastening at the wrist. A pair of photographer's india-rubber gloves completes the full dress of the apiarian, who is then invulnerable, even to enraged bees. But bees when swarming are in an eminently peaceful frame of mind;

having dined sumptuously, they require to be positively provoked before they will sting. Yet there may be one or two foolish bees who, having neglected to fill their honey bags, are inclined to vent their ill-humour on the kind apiarian. When all is ready, the new hive is held or placed in an inverted position under the cluster of bees, which the operator detaches from their perch with one or two quick shakes; the floorboard is then placed on the hive, which is then slowly turned up on to its base, and it is well to leave it a short time in the same place, in order to allow of stragglers joining their companions.

If the new swarm is intended for transportation to a distance, it is as well for it to be left at the same spot until evening, provided the sun is shaded from it: but if the hive is meant to stand in or near the same garden, it is better to remove it within half an hour to its permanent position, because so eager are newly-swarmed bees for pushing forward the work of furnishing their empty house, that they sally forth at once in search of materials.

A swarm of bees, in their natural state, contains from 10,000 to 20,000 insects, whilst in an established hive of Italian bees they number 40,000 and upwards. Five thousand bees are said to weigh one pound; a good swarm will weigh from three to five pounds. We have known swarms not heavier than $2\frac{1}{2}$ pounds that were in very excellent condition in August as regards store for the winter.

Hitherto, all our remarks have had reference to first or "prime" swarms; these are the best, and when a swarm is purchased, such should be bargained for.

Second swarms, known amongst cottage bee-keepers as "casts," usually issue from the hive nine or ten days after the first has departed. It is not always that a second swarm issues, so much depends on the strength of the stock, the weather, and other causes; but should the bees determine to throw out another, the first hatched queen in the stock-hive is prevented by her subjects from destroying the other royal princesses, as she would do if left to her own devices. The consequence is that, like some people who cannot have their own way, she is highly indignant; and, when thwarted in her purpose, utters, in quick succession, shrill, angry sounds, much resembling "*Peep, peep*," commonly called "piping," but which more courtly apiarians have styled the *vox regalis*.

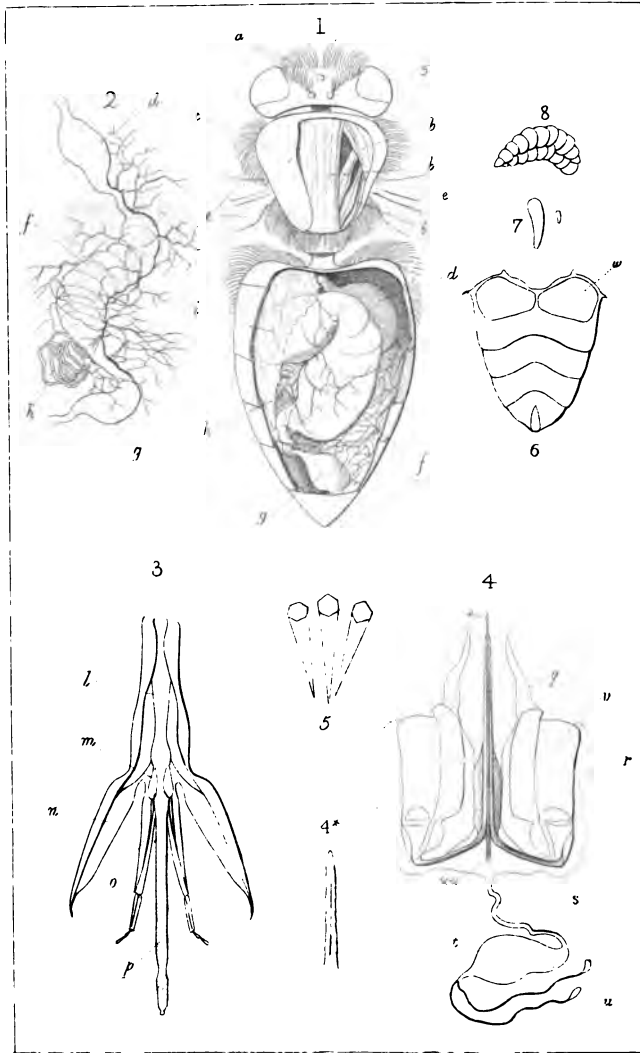
This royal wailing continues during the evening, and is sometimes so loud as to be distinctly audible many yards from the hive. When this is the case, a swarm may be expected either on the next day, or at latest within three days. The second swarm is not quite so chary of weather as the first; it was the *old* lady who exercised so much caution, disliking to leave home except in the best of summer weather.

In some instances, owing to favourable breeding seasons and prolific queens, a third swarm issues from the

hive ; this is termed a "colt : " and, in remarkable instances, even a fourth, which in rustic phrase is designated a "filly." A swarm from a swarm is called a "maiden " swarm, and, according to bee theory, will again have the old queen for its leader.

The bee-master should endeavour to prevent his labourers from swarming more than once ; his policy is rather to encourage the industrious gathering of honey, by keeping a good supply of "supers " on the hives. Sometimes, however, he may err in putting on the supers too early or unduly late, and the bees will then swarm a second time, instead of making use of the store-rooms thus provided. In such a case, the clever apiarian, having spread the swarm on the ground, will select the queen, and cause the bees to go back to the hive from whence they came. This operation requires an amount of apiarian skill which, though it may easily be attained, is greater than is usually possessed.







II.—ANATOMY AND PHYSIOLOGY OF THE BEE.

ALTHOUGH the principal object in compiling the present work has been the endeavour to induct our readers into the way of keeping bees according to the most recent and approved methods, it requires but little apology for thus apparently deviating from our prescribed course, by devoting a small portion of our space to a description of the anatomy of the wonderful little creatures whose labours all our contrivances are intended to assist, and since it will at once be admitted that a knowledge of their habits is not only interesting to the bee-keeper, but enables him to conduct his apiary in accordance therewith.

Of the insect tribe, the bee is certainly the most distinguished ; with the exception of the silkworm, none can approach her in ministering to the wants, or rather to the luxuries, of the human family. The instinct bees possess for feeding on flowers, bringing home honey and

pollen, and secreting wax, entitles them to our close consideration of their structure and of the tools provided them by Nature for carrying on their handiwork.

In a treatise of this kind, intended to be of a popular character, we shall endeavour to place these details before our readers in a concise and simple manner, avoiding as much as may be technical terms, and referring those who wish to go more deeply into this branch of the subject to the works of Bonnet, Huber, Kirby and Spence, Dr. Bevan, &c.

In the course of our description, we shall frequently have to refer to the steel engravings, Plates I. and II., drawn by Mr. E. W. Robinson, artist to the Entomological Society of London, who has most carefully dissected bees we sent him for the purpose, subjected these dissections to the microscope, and skilfully produced the accompanying illustrations, which will so much assist us in our agreeable task. These delineations are so clear, that a little explanation will suffice to bring home to the understanding of the curious the component parts of the bee, and the uses to which the various members are applied.

Because the bee is so small an insect, its organization ought not to be neglected to be investigated. "The bee is little among such as fly, but her fruit is the chief of sweet things." The enlightened Boyle, when contemplating the wonders of Nature, declared that his astonishment had been more excited by the mite than by the

elephant ; and that his admiration dwelt “not so much on the *clocks* as on the *watches* of creation.”*

The figures 1, 2, and 3, Plate I., in the frontispiece, respectively represent the exterior forms of the queen, the worker, and the drone. They are thus coloured to illustrate the Yellow Italian Alp, or Ligurian bee, now deservedly held in such high estimation by bee-keepers, and of whose good qualities we shall, in a subsequent section of this work, have occasion more fully to treat. All the bees constituting a stock may not be of quite so bright a colour as those represented: the old bees differ in appearance from the younger ones ;—darkened bodies and ragged wings, not grey hairs and wrinkled faces, are the signs of old age ; so that with bees (especially Ligurians), as with the gentler sex of the human race, there is appointed a period both of youth and beauty.

The anatomical structure of our English bee is much the same as that of the Italian ;† a description of the one will therefore serve for the other. The most apparent difference consists in the colour. The English bee is of a blackish brown ; both varieties have their bodies wholly covered with close-set hairs. These hairs deserve particular attention, because, although so small, each hair is

* Dr. Bevan.

† Naturalists consider the Italian bee a very superior race, and that the various organs are stronger and of greater capacity ; it is, however, not easy to define the precise anatomical superiority.

feather-shaped, consisting of a stem and branches somewhat analogous to the feathers of birds. This form is extremely serviceable to the insect, when revelling in the corolla of flowers, to collect the farina, and, besides thus useful, is peculiarly adapted for retaining animal heat.*

The insect is divided into three parts—the *head*, the *thorax* or *chest*, and the *abdomen*.

The head of the queen (Plate I., fig. 1 c), as also that of the drone (Plate I., fig. 3 c), is rounder than that of the worker-bee. The latter (Plate I., fig. 2 c) is of a triangular shape, and much flattened, as in Plate I., fig. 2* c, which shows the side view. In common with other creatures, the head contains the inlet for nutrition, and is the seat of the principal organs of sensation.

In the figures before alluded to may be seen the double visual apparatus with which bees are provided. The oval divisions on each side of the head are the two eyes, the secondary organs of vision being the three small eyes on the top of the head, called the *ocelli*. We shall first describe the two larger eyes, which, as seems to be the case with all insects, are immovable, and have neither irides nor pupils, nor eyelids to cover them, but are protected from the dust or pollen of flowers by a number of small hairs, as well as by a horny tunicle, which defends and secures them from injury. The multitude of hexagonal lenses which compose the eye of a bee make it

appear, when viewed through a microscope, exactly like honey-comb.* A German writer computes that in each eye there are 3,500 lenses. In Plate II., fig. 5 represents three of these hexagonal prisms or lenses, magnified.

The construction of the eye for seeing objects best at a moderate distance will account for the fact that bees mount high up into the air after collecting their store of food, and then, having determined the point, no matter how far off, they fly homewards with the directness of a cannon ball, and alight at the door of their own habitation, though the country around may be crowded with hives: but on reaching the entrance, their vision appears defective, for they then feel their way with the antennæ as if totally blind; and should the hive have been moved a little, they will rise again into the air to obtain a more distant view, suited to the lengthened focus of their sight.

When a stock or swarm is brought from a distance, bees do not take their departure at once, but reconnoitre awhile, visiting surrounding objects so as to well know the spot again, in order to return thereto.

The precise purpose or use of the three small eyes does not appear to be exactly known, except that they are intended to heighten the general sense of seeing which the creature so peculiarly requires. Some naturalists suggest that they are to give a defensive vision upwards from the cups of flowers.

* Dr. Bevan.

The mouth of the bee is a most complex structure, marvellously adapted for its duties, and consists of the mandibles, the ligula, or tongue, also called the proboscis, and other less important parts. The mandibles are the two sides of the upper jaw. Plate I., fig. 1 *d*, shows the mandible of the queen, which, similar to that of the drone (Plate I., fig. 3 *d*), is provided with two teeth, whilst the mandible of the worker (Plate I., fig. 2 *d*) is without teeth. The latter having to manipulate the wax with smoothness, the teeth would doubtless be objectionable. These mandibles are strong, horny, and sharp-pointed, to assist in breaking down food between them, and, in other respects, constitute serviceable tools with which to seize their enemies, destroy the drones, &c.

The tongue (Plate II., fig. 3), or proboscis, is a long, slender projection, flattish in form, and about the thickness of a bristle. It has about forty cartilaginous rings, each of which is fringed with minute hairs, having also a small tuft of hair at its extremity, where it is somewhat serrated. The tongue acts by rolling about, sweeping or lapping up, by means of the fringes around it, everything to which it is applied; thus, when a bee alights upon a flower, it pierces the petals and stamina, where the nectar is secreted, deposits its collection on the tongue, which, when withdrawn into the mouth, propels the gathered material into the gullet (Plate I., fig. 2 *c*) at its base, and from thence passes into the various internal organs, to which reference will be made hereafter. At

times, in building combs, the tongue is used as a trowel, with which the minute scales of wax are deposited in their appropriate places, and the desired finish is given to the cells. This organ was formerly described by naturalists as a hollow tube, but we now know, by dissection, that this is not the case, but that it acts as a brush, and, by a peculiar muscular contraction externally, draws the liquid into the mouth. Thus, when a bee is imbibing food, the rings of the abdomen have a vibratory motion similar to pumping, showing to the casual observer that suction is rapidly going on in some form or other.

The labial palpi (Plate II., fig. 3 *o*) rise from the base of each side of this lapping instrument, and are also ciliated exteriorly; outside these are the lower jaws, or maxillæ (Plate II., fig. 2 *n*), similarly provided with hairs. When the jaws (Plate II., fig. 3 *n* and *o*) close on the tongue, they form a sheath or defence thereto.

With the mandibles of the upper jaw opening right and left; and the maxillæ or lower jaws, which serve to hold the object laboured upon, the insect prepares its work for the sweeping-up apparatus of the lower parts. Thus, when combs become mouldy, or in any way unfit receptacles for brood or honey, these tools provided by Nature serve the place of hands, and the bees are able to chop up in small pieces, and remove from their dwelling, whatever lumber of this kind may be offensive to them. The whole of this apparatus, while perfect in action in an expanded state, can be folded or coiled together when

not in use, so as to form one strong and well-protected instrument.

The antennæ (Plate I., figs. 1*a*, 2*a*, 3*a*,) are most important instruments, and are planted between or below the eyes and a little below the ocelli, one on either side : they consist of a number of tubular joints, each having a separate motion ; being thus jointed throughout their whole length, they are, therefore, capable of every variety of flexure, and their extremities are exquisitely sensitive. With the antennæ, these insects recognise their queen, and appear to communicate to each other their joys and sorrows. For instance, if a colony be deprived of its queen, bees may be seen rushing about the hive, and, with a nervous twinge, crossing their antennæ and conveying the intelligence of their forlorn state. The sense of touch is here most acute. Huber points out a moonlight night as the best time for observing the antennæ in this respect. The bees guarding against the intrusion of moths, and not having light enough to see fully, circumambulate their doors like vigilant sentinels, with the antennæ stretched right before them ; and woe to the moth that comes within reach—the instant it is felt, its death follows. The sense of hearing has been denied bees, whilst others contend that these organs are situate in their antennæ. The sounds which bees emit, particularly at swarming time, are conclusive that they possess this faculty ; the only reason for arriving at an opposite conclusion seems to be, that no precise organ of

hearing can be found. Naturalists are now more united in the opinion that the seat of hearing is here located. The antennæ are said to have also another office, viz., that they act as a barometer, by which bees know the state of the weather and are premonished of storms; so that this pair of horns play an important part, since such useful faculties are thus combined. In the dark recesses of the hive the antennæ are exceedingly serviceable, and may truly be denominated "eyes to the blind." Bees possess acutely the senses of taste and smell. In consequence of their being detected occasionally lapping the impure liquids from stable or other foetid drains, Huber considered the former the least perfect of their senses. It is now ascertained that bees, like most animals, are fond of salt; and in spring, more especially, their instinct teaches them that salt is beneficial for their health after their winter confinement, and they therefore resort to dunghills and stagnant marshes, from which they are, doubtless, able to extract saline draughts.

It cannot be denied, however, that, according to our ideas, bees' taste is otherwise at fault; it sometimes happens that, where onions and leeks abound and are allowed to run to seed, bees are so anxious to complete their winter stores, that, from feeding on these plants, a disagreeable flavour is communicated to the honey. Again, the fact, well known in history, related by Xenophon in the retreat of the Ten Thousand, that bees in Asia Minor extracted honey from plants which

had not only a disagreeable but a poisonous tendency to man, shows that it is quite possible, where such poisonous plants abound, for the bees to extract the juices without any injury to themselves.

The sense of smell, so largely possessed by bees, is extremely serviceable to them. Attracted by the fragrance of flowers, bees may be seen winging their way a considerable distance in an undeviating course, even sometimes in the face of weather which one might have thought they would not have braved.

The thorax or chest approaches in figure to a sphere, and is united to the head by a thread-like ligament. This is the centre of the organs of motion. Here are attached both the muscles that move the legs and wings, and the legs and wings themselves.

In Plate II., fig. 1, *b*, *b*, *b*, show the muscles that move the wings; *c*, *c*, the bases of the wings.

The wings consist of two pairs of unequal size, which are hooked to one another. In Plate I., fig. A, will be seen the margins of the two wings. In fig. B are the eighteen or twenty hooks placed on the anterior margin of the hinder wing, whilst the posterior margin of the fore wing is beautifully folded over to receive them, so that, when distended for flying, the two wings on each side act as one to steady their movements in flight.

The bee has six legs, three on either side. Each leg is composed of several joints, having articulations

like a man's arm, for the thigh, the leg, and the foot. The foremost pair of these are the shortest ; with them the bee unloads the little pellets from the baskets on her thighs : the middle pair are somewhat longer, and the hindmost the longest of all. On the outside of the middle joint of these last there is, in each leg, a small cavity, in the form of a marrow spoon, called the "pollen basket." In Plate I., fig. 2 *b* shows the inner side of the hind leg and pollen brush ; 2 *b**, same figure, the outer side and pollen basket.

The legs are covered with hairs, more particularly the edges of the cavity mentioned, in which the kneaded pollen requires to be maintained securely. In this they convey those loads of pollen which are so constantly seen carried into a hive.

This basket, or pollen groove, in the thigh is peculiar to the worker ; neither queen nor drone have anything of the kind.

Another provision of the bee's limbs consists in a pair of hooks attached to each foot, with their points opposite to each other, by means of which the bees suspend themselves from the roof or sides of hives, and cling to each other as they do at swarming time or prior to and during the formation of new comb, thus forming a living curtain. In these circumstances, each bee, with its two fore claws, takes hold of the two hinder legs of the one next above it.

This mode of suspension is, no doubt, agreeable to

them, although the uppermost bees appear to be dragged by the weight of the whole. Wildman supposed that bees had a power of distending themselves with air, to acquire buoyancy, and thus lessen the burden of the topmost bees. They find no difficulty in extricating themselves from the mass; the most central of the group can make its way without endangering the stability of the grape-like cluster.

Bees are able to walk freely in an inverted position, either on glass or other slippery substances. The peculiar mechanism of their feet, which enables them to do so, consists in their having in the middle of each hook a thin membranous little cup or sucker that is alternately exhausted and filled with air. Flies have the same beautiful apparatus—hence a fly commonly selects the ceiling for a resting-place. These little air-cups, or exhausted receivers, may be seen by applying a strong magnifying-glass to a window that has a bee traversing the reverse side. The edges of these little suckers are serrated, so as to close against any kind of surface to which their legs may be applied. This apparatus may be also serviceable for gathering the pollen before transmitting it to the baskets on the hind legs. Besides these appendages and apparatus of the thorax, that region is traversed by the œsophagus or gullet (the opening to which will be found in Plate I., fig. 2 *c*), on its way to the digestive and other organs, situate in the third part of the insect—

viz., the abdomen. The covering of the thorax, with the external covering of the gullet, may be seen in the drawing of the magnified dissected body of the bee (Plate II., fig. 1).

The breathing apparatus of bees is a very remarkable feature: they have no lungs, but, instead, air-vessels or tubes, ramifying through every part of the frame. These openings, called "spiracles," are found in the sides of their bodies, behind the wings. Two of the openings are located in the thorax, and one on each side of the scales of the abdomen.

These air-vessels would be difficult to show in a drawing, the multitude of hairs which protect them are in the way of getting at a very distinct delineation. The writer has traced their oval form by the aid of Messrs. Smith and Beck's "Binocular Microscope," and exceedingly interesting objects they appeared. From the circumstance of bees breathing through these orifices in their bodies, it will not be difficult to understand how sadly the little creatures must be inconvenienced when, by accident, they fall on loose mould, and thus have their breathing pores choked with dust: it also shows how needful it is to prevent bees being besmeared with honey (by using bad appliances for feeding), which is still more injurious to them. These air-vessels are the only real circulating system, as bees have neither lungs, heart, liver, nor blood. It appears, however, that a white fluid matter, called "chyle," which, in degree, answers the purpose

of blood, is produced in the intestines, nourishes the body, receives the oxygen from the air-vessels, and generates that animal warmth so necessary for the insect's well-being. Bees have the power of counteracting superabundant heat by perspiration. Not unfrequently, on a hot summer's morning, a good deal of moisture may be noticed at the entrance of a crowded hive, which the inmates have been enabled to throw off. This is a healthy sign, because a sign of great numerical strength.

The abdomen, attached to the posterior part of the thorax by a slender ligament, has, for an outer covering, six folds or scales of unequal breadth, overlapping each other, and contains the honey-bag, or first stomach, the ventricle, or true stomach (Plate II., figs. 1 and 2 *f*), with other intestines, to be hereafter referred to.

The honey-bag (Plate II., figs. 1 and 2, *d*) is an enlargement of the gullet, and, although called the first stomach, no digestion takes place here. In shape it is like a taper oil flask; when full, it is about the size of a small pea, and so transparent that the colour of the honey may be seen through it. This sac, as it is sometimes called, is susceptible of contraction, and so organized as to enable the bee to disgorge a part of its contents at pleasure, to fill the honey-cells of the hive. It has formed a subject of some controversy whether any or what change takes place in the nectar of flowers whilst in the bee's stomach.

A short passage (Plate II., figs. 1 and 2, *f*) leads to the

ventricle or true stomach, which is somewhat larger. This receives the food from the honey-bag, for the nourishment of the bee and the secretion of wax. The stomach, like the honey-bag, has a considerable number of muscles, which are brought into play to help the digestive and other organs. The biliary vessels (Plate II., figs. 1 and 2, *h*, *h*) receive the chyle from the digested food in the stomach, which from thence is conveyed to all parts of the body for its support.

Formerly, naturalists thought that wax was elaborated from pollen; but it is now fully known that it is the animal fat of the bees, and to produce it requires a considerable consumption of honey to supply the drain upon the system. Whilst this secretion is going on, bees keep themselves very still. In order to pass through the pores of the abdomen, the wax is, no doubt, a liquid oily matter, which, on making its appearance outside the abdominal rings, thickens, and exudes from under the four medial rings, in flakes like fish scales, one on either side; so that there are eight of these secreting cavities, which are peculiar to the worker: they are not found either in the queen or drone. The shape of these cavities is that of an irregular pentagon, and the plates of wax, being moulded in them, exhibit accordingly the same form (see Plate II., fig. 5, *w*).

No direct channel of communication between the stomach and these receptacles, or wax-pockets, has yet been discovered; but Huber conjectures that the secret-

ing vessels are contained in the membrane which lines these receptacles, and which is covered with a reticulation of hexagonal meshes, analogous to the inner coat of the second stomach of ruminant quadrupeds.

The little plates of wax are withdrawn by the bee itself, with its hind feet, carried to the mouth with its fore feet, where the wax is made soft and ductile. When a cluster or swarm is placed in a new hive, and the bees suspend themselves in the form of a garland, as before described, it seems feasible that the lower bees pass their secretions up the living ladder to the uppermost ones, to be moulded by them into those beautiful white hexagonal shapes of which new comb is composed. The rapidity with which comb-building progresses at such times would lead to the supposition that there is a division of labour of this kind among them, just as our labourers convey building material to the artisan on the scaffold above. This work of comb-building is carried forward in warm weather ; a cold temperature interferes with the secretion of wax.

The last important organ of the abdomen is the sting : this small but effective weapon is situate close to the stomach, and is found in the queen and worker, but is absent in the drone. Our engraving (Plate II., fig. 4) exhibits the sting of the worker-bee, with its muscles and attachments : *r* shows the muscles that move the sting, and *q* the curved base of the sheath that encloses the sting.

Much beautiful mechanism is observed on a microscopic examination of this weapon and its appendages, so powerful in comparison with their bulk. The sting is composed of three separate portions, *i. e.*, two sheaths (as seen in Plate II., fig. 4) and the barb. The sheaths, which are attached to the powerful muscles on either side at *s*, are first protruded in the act of stinging, and, clasping the barb, enables the insect to bury it in the flesh to the depth of one-twelfth of an inch; at the same time, by a muscular contraction, the poison is forced along the groove, and the barb enters the wound, causing the well-known painful effects which arise from the sting of a bee.

The darts composing this instrument are furnished with teeth or barbs, set obliquely on their outer side, which give it the appearance of an arrow, and by which it is retained in the wound until the poison has been ejected.

If the sufferer could only command himself so as to remain perfectly passive, the bee might be able to draw in these barbs which protrude beyond the sheath, and would then have a chance of withdrawing the sting: the little insect would consequently inflict less pain, and might perhaps escape paying the penalty of her life. It generally happens, however, that the excitement of both parties is so great, that the poor bee leaves behind the whole apparatus, and even part of her intestines, so that her death is the result, and the wound is more

severe. The sting is about the sixth part of an inch long, and is largest at the base. Here are situated the glands or ducts (Plate II., fig. 4, *u*). By these the poison is secreted, and passed into the poison-bag (Plate II., fig. 4, *t*), which acts as a reservoir for retaining it till required.

On the subject of the sting, Paley remarks :—"The action of the sting affords a beautiful example of the union of chemistry and mechanism : of chemistry, in respect to the venom, which in so small a quantity can produce such powerful effects ; of mechanism, as the sting is not a simple, but a compound instrument. The machinery would have been comparatively useless had it not been for the chemical process, by which, in the insect's body, honey is converted into poison ; and, on the other hand, the poison would have been ineffectual without an instrument to wound, and a syringe to inject the fluid."

As before stated, the drone has no sting, but, in place thereof, the organs of reproduction. And now, in concluding this section, we would remark the wonderful mechanism and finish all the works of the Great Master Builder unfold. In the works of man we see, perhaps, a piece of mechanism of unquestioned beauty and excellence ; but there is a bolt here or screw there that might have been dispensed with, and does not possess any definite use, whilst in the works of Nature everything has a place ; we may not at once comprehend the exact

purpose of some intricate parts, but that only implies that we have not made a thorough investigation. The most minute hair serves its required end. "Canst thou by searching find out God? Canst thou find out the Almighty unto perfection?"





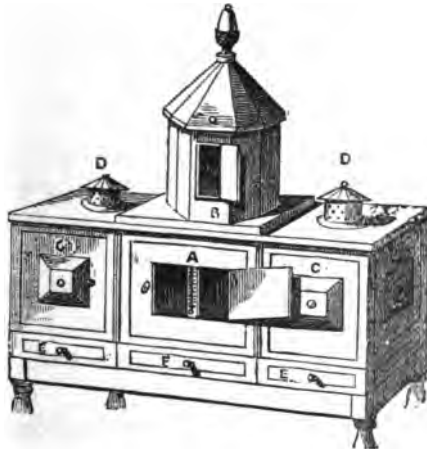
III.—MODERN BEE-HIVES.

NUTT'S COLLATERAL HIVE.

THE late Mr. Nutt, author of "Humanity to Honey Bees," may be regarded as a pioneer of modern apiarians; we therefore select his hive wherewith to begin a description of those we have confidence in recommending. Besides, an account of Mr. Nutt's hive will necessarily include references to the various principles which subsequent inventors have kept in view.

Nutt's Collateral Hive consists of three boxes placed side by side (c, a, c), with an octagonal box b on the top, which covers a bell-glass. Each of the three boxes is nine inches high, nine inches wide, and eleven inches from back to front. Thin wooden partitions, in which six or seven openings corresponding with each other are made, divide these compartments, so that free access from one box to the other is afforded to the bees; this communication is stopped, when necessary, by a zinc

slide passing down between each box. The octagonal cover *B* is about ten inches in diameter and twenty high, including the sloping octagonal roof, surmounted with an acorn as a finish. There are two large windows in each of the end boxes, and one in the centre box. Across the latter is a thermometer, scaled and marked, Across the latter is a thermometer, scaled and marked,



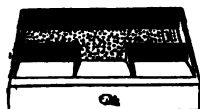
so as to be an easy guide to the bee-master, showing him, by the rise in temperature, the increased accommodation required ; this thermometer is a fixture, the indicating part being protected by two pieces of glass, to prevent the bees from coming between it and the window, and thereby obstructing the view.

D D are ventilators. In the centre of each of the end

boxes is a double zinc tube, reaching down a little below the middle : the outer tube is a casing of plain zinc, with holes, about a quarter of an inch wide, dispersed over it ; the inside one is of perforated zinc, with openings so small as to prevent the escape of the bees ; a flange or rim keeps the tubes suspended through a hole made to receive it. The object in having double tubing is to allow the inner one to be drawn up, and the perforations to be opened by pricking out the wax, or rather the propolis, with which bees close all openings in their hives. These tubes admit a thermometer, enclosed in a cylindrical glass, to be occasionally inserted during the gathering season ; it requires to be left in the tube for about a quarter of an hour, and on its withdrawal, if found indicating ninety degrees or more, ventilation must be adopted to lower the temperature. The ornamental zinc top must be left raised, and is easily kept in that position by putting the perforated part a little on one side.

The boxes before described are placed on a raised double floor-board, extending the whole length—viz., about thirty-six inches. The floor-board projects a few inches in front. In the centre is the entrance (as our engraving only shows the back of the hive, we must imagine it on the other side) ; it is made by cutting a sunken way, of about half an inch deep and three inches wide, in the floor-board, communicating only with the middle box ; it is through this entrance alone that the

bees find their way into the hive, access to the end boxes and the super being obtained from the inside. An alighting-board is fitted close under the entrance, for the bees to settle upon when returning laden with honey. This alighting-board is removable for the convenience of packing. The centre, or stock-box A, called by Mr. Nutt the *Pavilion of Nature*, is the receptacle for the swarm. For stocking this, it will be necessary to tack the side tins so as to close the side openings in the partition, and to tack some perforated zinc over the holes at top; the swarm may then be hived into it just the same as with a common hive. A temporary bottom board may be used if the box has to be sent any distance, or a cloth may be tied round to close the bottom (the latter plan is best, because allowing plenty of air); and when brought home at night, the bees being clustered at the top, the cloth or temporary bottom must be removed, the box gently placed on its own floor-board, and the hive set in the place it is permanently to occupy. $\Sigma \Sigma$ are two block fronts, which open with a hinge. A semicircular hole, three inches long and two inches wide in the middle, is cut in the upper bottom-board, immediately under the window of each box; these apertures are closed by separate perforated zinc slides. These blocks, when opened, afford a ready means of reducing the temperature of the side boxes, a current of air being quickly obtained, and are also useful for allowing the bees to throw out any refuse.



The centre *r* is a drawer, in which is a feeding-trough, so constructed that the bees can descend through the opening before mentioned on to a false bottom of perforated zinc. Liquid food is easily poured in by pulling out the drawer a little way; the bees readily come down on to the perforated zinc, and take the food by inserting their probosces through the perforations, with no danger of being drowned. Care must be exercised that the food is not given in such quantity as to come above the holes; by this means, each hive has a supply of food accessible only to the inmates, with no possibility, when closely shut in, of attracting robber-bees from other hives.

The exterior of these hives is *well* painted with two coats of lead colour, covered with two coats of green, and varnished. Notwithstanding this preservation, it is absolutely essential to place such a hive under a shed or cover of some sort, as the action of the sun and rain is likely to decay the wood, whilst the extreme heat of a summer sun might cause the combs to fall from their foundations.

Neat and tasteful sheds may be erected, either of zinc supported by iron or wooden rods, or a thatched roof may be sustained in the same manner, and will form a pretty addition to the flower-garden.

When erecting a covering, it will be well to make it a

foot or two longer, so as to allow of a cottage hive on either side, as the appearance of the whole is much improved by such an arrangement.

The following directions, with some adaptation, are from "Nutt on Honey-Bees":—

"In the middle box the bees are to be first placed : in it they should first construct their beautiful combs, and under the government of one sovereign, the mother of the hive, carry on their curious work, and display their astonishing architectural ingenuity. In this box, the *regina* of the colony, surrounded by her industrious, happy, humming subjects, carries on the propagation of her species, deposits in the cells prepared for the purpose by the other bees thousands of eggs, though she seldom deposits more than one egg in a cell at a time : these eggs are nursed up into a numerous progeny by the other inhabitants of the hive. It is at this time, when hundreds of young bees are daily coming into existence, that the collateral boxes are of the utmost importance, both to the bees domiciled in them and to their proprietors ; for when the brood become perfect bees in a common cottager's hive, a swarm is the necessary consequence. The queen, accompanied by a vast number of her subjects, leaves the colony, and seeks some other place in which to carry on the work Nature has assigned her. But as swarming may, by proper precaution and attention to this mode of management, generally be prevented, it is good practice to do so, because the time

necessarily required to establish a new colony, even supposing the cottager succeeds in saving the swarm, would otherwise be employed in collecting honey, and in enriching the old hive. Here, then, is one of the features of this plan—viz., *the prevention of swarming*. The period when symptoms of swarming begin to present themselves may be known by an unusual noise, the appearance of more than common activity among the bees in the middle box, and, above all, by a sudden rise of temperature, which will be indicated by the quicksilver in the thermometer rising to seventy-five degrees, as scaled on the thermometer in the box; when these symptoms are apparent, the bee-master may conclude that additional space is required. The top sliding tin should now be withdrawn from under the bell-glass, which will open to the bees a new store-room; this they will soon occupy, and fill with combs and honey of pure whiteness, if the weather be favourable for their uninterrupted labour. It may be well here to mention, that if the glass have a small piece of clean worker comb attached to the perforated ventilating tube, the bees will more speedily commence their operations in it. When the glass is nearly filled, which in a good season will be in a very short space of time, the bees will again require increased accommodation; this will also be indicated by the thermometer further rising to eighty-five degrees. The end box, as thereon marked, must now be given them. Previously to drawing up a slide to enlarge their crowded house, the

manager should carefully take off the empty end box he intends to open to them, and thoroughly cleanse it, and then smear or dress the inside of it with a little liquid honey. Thus prepared, he must return the box to its proper situation, and then withdraw the sliding tin that hitherto has cut it off from the middle box; by so doing, the store-room is again enlarged. The bees will commence operations in this new apartment. This simple operation, performed at the proper time, generally prevents swarming; by it the queen gains a vast addition to her dominions, and, consequently, increasing space for the multiplying population of her domicile. Provided the weather continue fine, and the thermometer has risen to ninety-five degrees, as marked on the scale, the remaining tin may be also withdrawn, thereby giving the bees admittance to another box. There is now no lack of store-rooms or of employment for our indefatigable labourers. The cylinder thermometer is required to be occasionally dropped into the ventilating tube of the side boxes to ascertain their temperature; for, if exceeding or approaching that of the middle box, it must be reduced by ventilating: this is done by raising the zinc tops, to allow the air to pass through the perforations. The grand object of this system is to keep the end boxes and the bell-glass cooler than the pavilion or middle box, so as to induce the queen to propagate her species there and there only, and not in the depriving part of the hive; by this means the side and upper combs are

in no way discoloured by brood. The queen requires a considerable degree of warmth; the middle box does not require more ventilation than the additional openings afford. The bees enjoy coolness in the side boxes, and thereby the whiteness and purity of the luscious store are increased.

After the foregoing directions for the working of the hive, it remains to be told how to obtain possession of the store, and to get rid of our industrious tenants from the super and end boxes, of which the super glass will be almost sure to be filled first, having been first given to them. The operation of taking honey is best performed in the middle of a fine sunny day. The mode we prefer is as follows:—Pass an ordinary table-knife all round underneath the rim of the glass, to loosen the cement, properly called propolis; then take a piece of fine wire, or a piece of string will do, and, having hold of the two ends, draw it under the glass very slowly, so as to allow the bees to get out of the way. Having brought the string through, the glass is now separated from the hive; but it is as well to leave the glass in its place for an hour or so; the commotion of the bees will then have subsided: and another advantage we find is, that the bees suck up the liquid and seal up the cells broken by the cutting off. You can then pass underneath the glass two pieces of tin or zinc; the one may be the proper slide to prevent the inmates of the hive coming out at the apertures, the other tin keeps all the bees in the glass close prisoners.

After having confined the bees in the glass for a short time, you must see whether they manifest symptoms of uneasiness, because, if they do not, it may be concluded that the queen is among them. In such a case, replace the glass, and recommence the operation on a future day. It is not often that her majesty is in the depriving hive or glass; but this circumstance does sometimes happen, and the removal at such a time must be avoided. When the bees that are prisoners run about in great confusion and restlessness, the operator may conclude that the queen is absent, and that all is right. The glass may be taken away a little distance off, and placed in a flower-pot or other receptacle, where it will be safe when inverted and the tin taken away: the bees will then be glad to make their escape back to their hive. A little tapping at the sides of the glass will render their tarriance uncomfortable, and the glass may then be taken into a darkened room or out-house, with only a small aperture admitting light, which must be open; the bees, like all insects, make towards the light, and so escape. The bee-master should brush them off with a feather from the comb as they can be reached; but on no account, if there are many bees, should the glass be left, because the bees that are in the glass will gorge themselves to their full, and speedily bring a host of others from the adjacent hives, who, in a very little time, would leave only the empty combs. It is truly marvellous how soon they will carry all the store back

again, if allowed to do so. An empty glass should be put on to the hive in place of the full one, as it will attract the bees up, thereby preventing the too close crowding of the hive ; and, if the summer be not too far advanced, they will work more honeycomb in it.

The removal of the end boxes is a somewhat similar process, but they should on no account be taken away at the same time as the glass, or, indeed, at a time when any other hive is being—*robbed* we were going to say, for it is robbery to the bees : they intended the honey for their winter food, and are much enraged at being deprived of it. First shut down the dividing tin ; the bees in the end box are now prisoners separated from the hive ; keep them so half an hour, and then take away the box bodily to another part of the garden, or into the dark out-house, as before recommended.

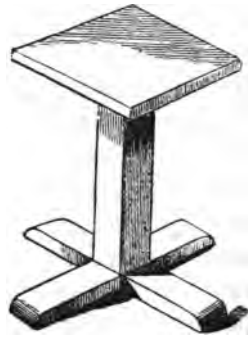
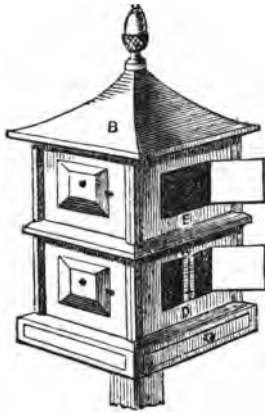
It may not be out of place here to say something respecting the enthusiastic inventor of the collateral hive—Thomas Nutt—who was an inhabitant of Spalding, in Lincolnshire. Having been disabled during a considerable period by rheumatic fever, he devoted all his attention to bees, at a time when bee-culture was but little valued ; and, although it must be admitted that two boxes were used side by side long before Mr. Nutt's day, still it is due to him to state that the adoption of three boxes was entirely his own idea, and that, so far as he then knew, the collateral system was his original invention. His statements have been

severely criticised, and it does appear almost incredible that the weight of honey which he names could have been produced in one season. But as in the district where he lived there is grown an immense quantity of mustard seed—the flowers of which afford excellent forage for bees—the honey harvests there would, doubtless, be very large. If Mr. Nutt has given his little favourites too much praise, it will be only charitable now to account for his statements by an excess of zeal and enthusiasm in this his study of bee-culture. It may be that the golden harvests he spoke and wrote of have been so far useful that they have induced many to commence bee-keeping, some of whom, whilst they condemned his statements, have themselves written really useful and practical works on the subject, which otherwise might possibly never have appeared. As the monks of old kept the lamp of religion burning, however dimly, until a more enlightened age, so Thomas Nutt may have assisted in a somewhat similar manner by energetically propounding his views, and thereby causing other apirians to rise up, whose names are now as familiar to us as household words, and whose works posterity will value. The writer of these pages has often accompanied Mr. Nutt on his visits to his patrons in the neighbourhood of London, and seen him perform his operations regardless of the anger of the bees, and free from all fear of their stings. He often expatiated on the cruelty of the brimstone match and suffocation, denounc-

ing the barbarous custom in the following terms : “ You may as well kill the cow for her milk, or the hen for her eggs, as the bee for its honey ; why continue to light the fatal match, when every cottager in England has the means of saving this most useful and valuable insect ? ”

NEIGHBOUR'S IMPROVED SINGLE BOX HIVE.

We have introduced the “ Single Box Hive ” to suit the convenience of those who, though desirous of keep-



ing bees on the improved principle, do not wish to incur the expense or devote the space which is necessary for Nutt's hive.

It consists of a lower or stock-box *A*, eleven inches square, nine inches deep, with three large windows, a thermometer *D*, as in Nutt's, being fixed across the front one, protected at the sides by strips of glass, to prevent the bees obscuring the quicksilver from sight. *B* is a cover the same size as the lower hive, large enough to allow space for a bell-glass nine inches wide, six inches deep. *E* is the ventilator between the glass and the stock-hive, intended to prevent the queen travelling into the super hive, and also, by cooling the hive, to endeavour to prevent swarming; a sloping pagoda roof, with an acorn top, completes the upper story. A floor-board with a block front, as in Nutt's collateral, forms the base, the entrance being sunk, as before described, and furnished with zinc slides to reduce or close it as may be required. To stock a hive of this description, it is necessary to send the stock-box to the party with whom you have agreed for the supply of a swarm. In the evening of the day the hive is thus tenanted, remove it to the position it is designed permanently to occupy; if the swarm has to be procured from a distance, and is transported by rail or other conveyance, a perforated zinc slide should be substituted for the plain slide that covers the top, and a large piece of perforated zinc must also be tacked to the bottom after the swarm has settled in. Thus securely confined, with a free circulation of air throughout, bees that have been swarmed the day before may be safely sent any distance that will allow of their being released the day after;

because bees, though they provision themselves for a couple of days, cannot with safety be confined in an empty hive much longer.

Having now, we will suppose, procured your swarm, and placed it in a south or south-east aspect, you may, with advantage if the weather be wet, give a little liquid food : the feeding in this hive is performed at the top of the stock-box, where the glass is worked. Our round feeding pan, or the new feeding bottle, may here be used. Any fancy as to the position may be indulged in, but must be settled on by the time the bees are set at liberty, because any alteration afterwards is detrimental to the working of the hive. The bees, on first issuing forth, carefully mark their new abode and the surrounding objects, so that, if a change be made, they are completely thrown out in their observations, which confuses them not a little, and occasions loss. Bees always return to the same spot ; it is the locality that they know, and if the hive is moved a less distance than a mile, thousands return to the spot on which the hive has been accustomed to stand.

Allow your bees to collect honey and build their combs for ten days or a fortnight. Much now depends on the weather ; if fine, by this time they will require additional room, which will be indicated by the thermometer rapidly rising ; 100 degrees is the swarming point. The hive must be kept below this by ventilation.

Access must now be given to the flat bell-glass at the

top, which is done by withdrawing the top slide. In a few hours, sometimes immediately, the work of comb-building begins in the glass—all the sooner, if a piece of clean empty comb be placed therein.

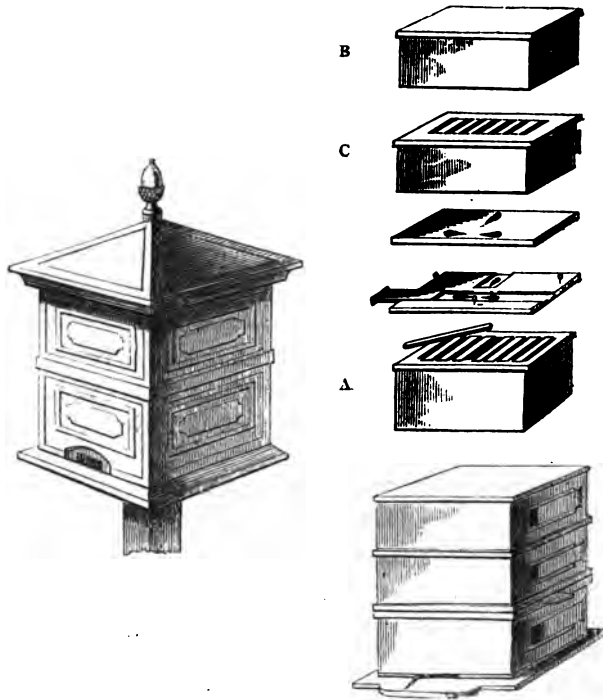
It is of service to keep the glass warm by means of a worsted or baize bag ; it prevents the temperature from falling at night, when much comb-building is carried on, providing the heat is not allowed to escape. Probably, if all goes on well, in three weeks the glass will be found filled with fine white honey-comb. When you find that the comb is well sealed up, it is time to take it off ; but if the cells are unfilled and unsealed, let the labourers complete their work—a little experience will soon enable the bee-keeper to determine this point.

The plan to be adopted for taking glasses of honey-comb is the same as described for Nutt's hive.

TAYLOR'S AMATEUR SHALLOW BOX OR EIGHT-BAR HIVE.

Taylor's Amateur Hive, as seen by reference to the engraving, consists of three boxes—the lower one, *A*, is the stock-box, in which the swarm is first placed ; *B* is the first super ; and *C*, the centre box : all three boxes are of the same diameter, viz., thirteen and a half inches square inside. *A*, the stock-box, is seven and a half inches deep ; *B*, six and a half inches : both are fitted with eight moveable bars, each bar being one inch and an eighth wide, with spaces of half an inch between, and all

easily removed by unscrewing the crown-board, in which are two openings closed by zinc slides. The middle box, c, has no bars, and is still shallower than either of the



other boxes, being five inches deep. In many localities and seasons, the third box may not be required. Each box has two windows, one at the back and another at the side, a zinc shutter, sliding in a groove, excluding

light and retaining warmth. The box c differs from the others in another respect ; instead of bars, it has a grating made by seven openings, each half an inch wide and nine inches long : these three boxes stand on a stout floor-board, in which is cut the entrance way, four inches wide and three-eighths of an inch high. The floor-board projects so as to support an outer cover of half-inch wood, surmounted by a sloping roof. This is an effectual protection from the weather, and is necessary when hives are exposed ; of course, if placed in a bee-house, such protection may be dispensed with. The outer case is well painted, of a green colour, and when it is used the hive may be placed in any part of the garden. The dimensions of this hive, with outside cover, are eighteen inches square, and two feet six inches high.

Suitable stands are provided, consisting of a stout pedestal with four feet. Stakes should be driven into the ground to secure the whole against wind. Height from the ground, four feet three inches.

The bars before alluded to are for the purpose of inducing the bees to build parallel combs, for without such an arrangement extraction would be impossible. It is a great convenience, in many ways, to be able to take out a bar of comb ; it gives such a complete control over the hive.

To ensure comb-building on the bars, pieces of clean worker-comb should always be carefully preserved ; and before a swarm is put in, either every bar or, if

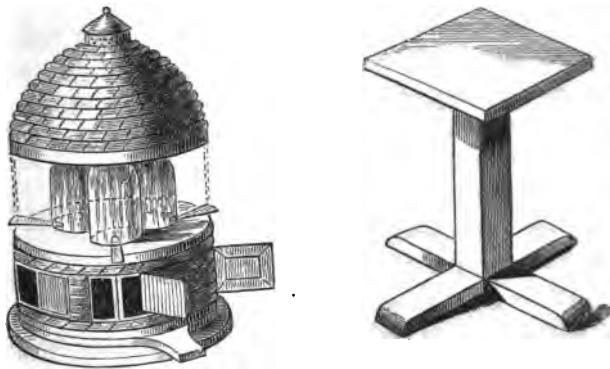
guide comb is not plentiful, every other bar should have a piece fixed to it in the following manner:—Cut a piece of clean empty comb of the required size, say two inches square, not less; heat a common flat iron, with which slightly warm the bar; then melt a little bees'-wax upon it; draw the comb quickly over the heated iron, hold it down on the centre of the bar, giving a very slight movement backwards and forwards; then leave the wax to grow cold, and, if cleverly managed, the guide will be found firmly attached. Care must be taken that the pitch or inclination of the comb be the same as it is in the hives—upwards from the centre of each comb. A new plan has lately been introduced by Mr. Woodbury, of Exeter, to facilitate the correct construction of parallel combs.

NEIGHBOUR'S IMPROVED COTTAGE HIVE.

Our Improved Cottage Hive is neatly made of straw, bound with cane, and therefore very durable.* The lower hive is covered with a wooden top, having in it three holes, through which the bees convey their honey into three middle-sized bell glasses with ventilators,

* This is the hive referred to by the Bee-Master of the *Times*, when he says:—"The second kind of hive I alluded to is made of straw, and may be purchased at Neighbour's, in Holborn. . . . It is so well made that it will last very long. I have had one in constant use during ten years, and it is still as good as when it was bought."

which, when filled, hold about 6 lbs. each. There is a hoop at the bottom, another round the top of the lower hive; to this the wooden crown-board is fastened. These hoops are a great improvement, and are less liable to harbour insects than if straw alone were used. The floor-board, as its name implies, is a wooden board one and a quarter inch thick, with a projection of three or four inches under the entrance to form an alighting place. This entrance is cut out of, or sunk in, the board.



There are three windows in the lower hive, each closed with a shutter; these are very useful and interesting for inspecting the progress made. Across the centre window is a thermometer, enclosed at the sides by slips of glass. The window shutters being painted green, add very much to its appearance. The upper hive, which is merely a cover for the glasses, is a conical-

topped hive, also made of straw bound with cane; a hoop is worked into the straw, and made sufficiently large to allow the cover to drop over the top hoop of the lower hive, keeping the whole close, and preventing wet from drifting in. A zinc ventilator, ornamentally painted, forms the apex: this is useful in letting the confined hot air pass away in warm weather. The ventilator is opened by raising it. The dimensions of the lower or stock-hive are fifteen inches diameter, nine and a half inches deep outside; its weight, when empty, seven and a half pounds. The cover, or top hive, is twelve inches deep and fifteen inches in diameter; the ornamental zinc top being four inches deep. The whole is about twenty-four inches high. The weight of a hive packed, including glasses, &c., is about 18 lbs.

These hives have a tasteful appearance in the garden, but they require some further protection from the weather in the form of a cover or of a bee-house—contrivances that have yet to be described. In extreme cold weather, a little additional protection, by having matting folded round them, will be advisable.

One of the advantages this hive has over the common cottage hive is, that it affords opportunity for the humane management of bees. The owner has also the power of taking a glass of honey-comb of pure quality, free from the extraneous matter known as "bee-bread," instead of combs that are darkened by having brood hatched in them. By this system, we have combs newly made and

used only for depositing the honey first put into them ; hence the name " virgin honey." These glasses have a very pretty appearance, and, when nicely filled, are very convenient for home use or for making presents. The lower hive is the receptacle for the bees ; when a swarm is placed in this hive, they immediately proceed to fill it with combs, in which to store honey for themselves, and for cells to breed in. This hive remains undisturbed.

The best mode of tenanting a hive of this description is by placing an early and strong swarm in it, which may be generally procured of a neighbouring bee-keeper ; if from a distance, considerable care is necessary to admit plenty of air ; the shaking attendant upon carriage irritates the bees so much, that, if not well ventilated, there is danger of the swarm being stifled, and the finer the swarm, the greater the danger. For the purpose of ventilation, remove the slides and substitute perforated zinc, wrapping the hive up in a coarse cloth of open texture (dispensing with the floor-board during transit when the distance is great).

It is necessary only to send the lower or stock hive to the party furnishing the swarm, taking the precaution to fix the slides at top with tacks, as the hive has to be inverted to receive the bees. They are shaken into it in the usual manner,* as they cluster around the branch of the tree or shrub on which they may have chosen to

* Sometimes swarms alight on trunks of trees or on walls, where it may be difficult to shake or brush them off. In the *Journal of Horticulture*, Mr. Woodbury mentions an instance of

alight. After the hiving is accomplished, the hive should be left near to catch any stragglers, for there will always be a few; towards evening, close the entrance, and remove them to the exact position they are intended permanently to occupy. Success depends on this, and also on their careful removal on the day or evening of swarming. The following morning the bees labour in the new location, marking well their habitation before they take flight, and to which they will not fail to return, loaded with luscious store.

A fortnight must be allowed for filling the stock-hive; then, if the weather be fine and warm, they will prepare to swarm again, as will be indicated by the thermometer rising rapidly to 100 degrees or upwards. One of the zinc slides on the wooden top must now be withdrawn, and a bell-glass put on, covered and protected by the upper hive; the other glasses may then be given in the same manner, a day or two after which, should the weather continue favourable, all signs of swarming will at once disappear, the bees now having increased store

this kind, which he experienced last summer :—" A swarm clustered among the large branches of a pear-tree, just at their point of union with the trunk. In this case he merely supported a straw hive just over the swarm with the left hand, whilst he struck the trunk of the tree with the open palm of the right. The vibration thus produced sent the bees up into the hive with great rapidity, and the entire swarm was speedily hived in the most satisfactory manner." A few whiffs of smoke will accelerate upward movement of swarms in such circumstances.

room, which they will readily fill with comb. It is often found useful to attach a piece of clean empty honey-comb to the ventilating tube of the glass; it is an attraction, and induces the bees to commence working in it sooner than they otherwise would do. The ventilator should always remain open during the day, to allow the hot air to pass away from the interior, thereby contributing to the whiteness and beauty of the work; the bees enjoy the refreshment of coolness thereby afforded, and they work the faster for it. At evening, all ventilation should be stopped, and the glasses wrapped round with flannel or some warm material, for the reasons mentioned at page 65.

The directions for taking honey are much the same as before mentioned. Some apiarians, however, consider that deprivation is more easily accomplished by disconnecting the super over night, in the manner described at page 58. The bee-keeper, equipped with bee-dress and gloves, must first raise the glass of comb, and, blowing a little smoke to intimidate and drive back the bees, wedge it up all round, an inch or so from the crown-board, by means of three or four blocks, thus to remain all night. This operation is best performed a little before dusk. Bees are then less likely to come out, and if they should do so, will speedily return. The opening in the crown-board remains unclosed, to afford the bees the opportunity of descending and joining the stock-hive below, which they will naturally do for warmth. The upper

straw-hive, or cover for the glasses, is better placed on for the night. Early in the following morning, before the bees are much about, the super will be ready for removal. The few bees that remain within may be speedily induced to quit, and will fly to the entrance. The slides covering the holes in the crown-board must be inserted, or an empty glass can be put on, to take the full one's place. A slide seven and a half inches square is furnished with the hive; this is useful to remove the glass upon.

The holes in the wooden top of this hive are of a peaked shape, to act as a preventive against slaughtering any bees whilst pushing the slide in for the purpose of removing the glass when full. The tacks before alluded to should be removed from the slides when the hive is fixed in its place; they are now in the way of cutting off the glass. The entrance slide is very serviceable during the winter months, to lessen the passage way, thereby preventing the admission of too much cold air: it is also occasionally useful on a summer evening, to lessen the entrance when moths are troublesome; for if there be only a small opening, the bees can guard it, and easily repulse intruders. During the time of gathering, they require the whole width to remain open.

When the weather is so unfavourable as to prevent the bees leaving home for a few days after being hived, it will be necessary to feed them. Bees should not be

fed in the midst of winter; the proper time is in the autumn or in the spring.

The best mode of feeding is at the top of the stock hive. This is done by using the round feeder.

The bottle feeder may be used instead of the round feeder, and in the same place, by those who give the preference to that method.

Whilst on the subject of feeding, it may be well to suggest to the bee-keeper, that, after the honey harvest, he should ascertain the state of the stock-hive, because we have sometimes found that hives which were very strong during summer, and which have yielded a good supply of honey, have been left rather poorly off for the winter. No doubt, under the impression that those nicely-filled supers which the bees intended for themselves would be amply sufficient for their sustenance, they have, for the most part, devoted the space below to the queen for breeding, little imagining that the precious store would be taken away, and consequently have left themselves too small provision for autumn and winter.

The apiarian having, therefore, so richly reaped the fruit of his bees' labours, it is but right that he should guard against the labourers themselves suffering any want therefrom. The state of the interior of the hive may be ascertained by applying a weighing machine, and the requisite supply administered by feeding. Both weighing machine and feeder are described further on.

The simplicity and easy management of this hive have deservedly rendered it an especial favourite, combining, as it does, real utility with many conveniences to satisfy the curious. Not a few bee-keepers desire to unite the two qualifications, and no hives combine these advantages in a greater degree than Neighbour's improved cottage hive.

IMPROVED COTTAGE HIVE WITHOUT WINDOWS.

This hive is of precisely the same size, construction, and management as the last mentioned, with the exception that it has no windows or thermometer in the lower or stock hive. The apiarian, with this hive, will have to trust more to his own judgment as regards the likelihood of swarming, and must watch the appearance the bees present at the entrance. When it is time to put on supers, in order to prevent swarming, premonition will be given by the unusual numbers crowding about the entrance, as well as by the heat of the weather, making it evident that more room is required for the increasing population.

Not being able to form an idea of the state of the hive in spring and autumn by looking into the stock-hive, it will be advisable to adopt the means of weighing. A stock at Michaelmas should weigh 20 lbs., exclusive of the hive, or be made up to that weight by feeding.

**THE LADIES' OBSERVATORY OR CRYSTAL
BEE-HIVE.**

The following engraving illustrates the construction of the Ladies' Observatory Hive. The stock-hive is cylindrical, with a flat top and a hole in the centre; the dimensions twelve and a half inches inside, eight and a half inches deep; the outer cover being raised, and made of stout glass, so as not easily to break. A support, composed of even wooden bars fixed on a pedestal from the floor-board, is very useful for the bees to cling to and attach their combs, instead of resting wholly against the glass.



The floor-board is of mahogany, the border being French polished. A middle-sized bell-glass, for deprivation, is placed over the hole; this hole may be closed by a zinc slide. A cover of straw, eighteen inches deep, fifteen inches wide, with a zinc ventilating top similar to that affixed to the cottage hive, completes the arrangements. The weight of the stock-hive and board is about 16 lbs.

This hive is well adapted for those persons who are desirous of having the opportunity of more closely examining the workmanship of these industrious and interesting insects, as the whole of the interior may be

exposed to view ; it is particularly suitable for a window or an indoor apiary, and will also be found a valuable addition to the greenhouse. Under these circumstances, the entrance-way should be covered with a flat piece of glass, and an aperture cut in the sash corresponding with the entrance to the hive ; through the glazed passage the bees may then find egress and ingress without being able to gain access to the apartment. An alighting board, four inches wide, must be fixed outside, on a level with the entrance.

We had a hive of this kind in operation at the Great Exhibitions of 1851 and 1862, fixed after the manner above described. It answered admirably, and excited much interest and curiosity, though placed there under many disadvantages.

When a hive of this kind is to be stocked, procure an early and strong swarm, which must be temporarily hived in a common straw hive, from which dislodge the bees into the glass hive, but for this purpose a little preparation will have to be made. Spread a sheet on the ground, place the mahogany floor-board on it with the support, put three bricks, or some solid blocks of about the same substance, upon which the glass will rest ; then, with a sharp and sudden blow, precipitate the swarm out of the straw hive on to the floor-board and support, place the glass hive on the bricks, and the bees will collect under the bars and on to the pedestal. In about one hour's time the whole will have settled quietly

and all the stragglers on the board will have collected together, the swarm hanging pear-shaped from the bar support; the bricks can now be removed, and the glass put in its right place on the floor-board. The straw cover being put on the hive, it can be removed to the place it is destined permanently to occupy.

The light should not be admitted for some days after hiving; if undisturbed, the bees will speedily build comb, working from the wooden bars, which are placed there for their assistance and support. In ten days or a fortnight, if the weather continue fine and warm, they will prepare to swarm again; the opening at the top must now be unstopped, and the bell-glass put on, guide-comb having been previously fixed. The directions given for the improved cottage hive equally apply to the ladies' observatory hive.

It is advisable, in winter, to furnish the glass stock-hive with more protection from cold than is afforded by the straw cover alone; some thick baize, or wrapper of wadding, for which there is space between the glass hive and the cover, will prevent so much moisture condensing on the sides of the glass. Moisture is injurious, causing the combs to grow mouldy; a little protection in the way of wrapping very much prevents this.

The hole at top is used for supplying food, should the apiarian fear the stock of honey is in danger of running short; either the bottle feeder or the round feeder may be used for the purpose.

COTTAGER'S HIVE, FOR TAKING HONEY IN
STRAW CAPS, WITHOUT THE DESTRUCTION
OF THE BEES.



A very prevalent opinion exists, that bees do better in straw than in hives made of any other material. Another opinion prevails, viz., that the old-fashioned straw hive is the least expensive, the most simple, and the most productive. Although we cannot go so far as this, we are willing to admit that a simplified adaptation of the

humane system to the old common straw hive is the most suitable to put into the hands of that large class of bee-keepers—*cottagers*. By these the more fanciful hives will be instantly condemned; besides, the expense puts them quite beyond the reach of the poorer class. The object aimed at in planning our Cottager's Hive has been to furnish a depriving hive that should be at once easy of management, inexpensive, and convenient. The stock-hive, into which the bees are first hived, is a round straw hive, having a flat top, with a hole in the

centre. The size of this lower hive is seven or eight inches deep, fourteen inches across the bottom, finished with a wooden hoop, which adds very much to the firmness and durability of the hive. The floor-board is one and a quarter inch thick, with a way sunk therein for the entrance. A small round mat of straw closes the hole in the top; this mat may be fixed by wooden pegs. We have now described what is termed the *stock-hive*, which is, in fact, an old-fashioned straw hive, adapted, modernised, and improved to the more humane, viz., the depriving, system. The weight of the stock-hive, with its floor-board, is about 7 lbs.

The super or cap hive is about seven inches deep, eight inches in diameter, and, when filled, contains about 10 lbs. of honey and comb. A glass window, which is placed at the side, is useful for inspecting the progress made in filling it.

A common straw hive, sufficiently deep to cover, drops over the super, keeping the window dark, and fitting close on to the stock-hive. This cover-hive may be made fast by driving in two skewers, one on either side, to keep the whole firm. Unless placed in a beehouse or under a shed, the outside should be painted; or a piece of oil-cloth, or waterproof covering of any kind, shaped so as to shoot off the rain, will save the trouble of paint, and answer the purpose. If no protection of this sort is used, the rain is likely to rot the straw. As a covering, cottagers often use straight stiff thatching

straw, sewed together; this contrivance is termed a "hackle," and has a pretty appearance, particularly if a number of hives are in a row. Care has to be exercised that mice do not make the covering hive a resting-place. Mortar is often used for fastening round the hive at the bottom: this is a bad plan, as it forms a harbour for insects; the wooden hoop fits so close as to leave little necessity for anything of the kind.

The principle of the depriving system is so much the same with all our hives, that a good deal of repetition is necessary in describing in detail the management of each separate variety. The object aimed at with the cottager's hive, as, indeed, with all our hives, is to provide a compartment for the bees to live in with their queen, she being the mother of all. It is intended, by inducing the queen to remain in her original apartment, that all breeding should be there performed, as well as the storing of bee-bread and honey, for the winter sustenance of the bees. The cap hive, or upper chamber, known as the "super," is for the storing of honey, which the bee-keeper looks upon as a surplus, and which, at the close of the honey gathering, or as soon as filled, he intends to deprive the bees of, and appropriate to his own use, of course taking care to leave sufficient in the lower or stock hive for winter sustenance.

The mode of stocking a hive of this kind is so familiarly known, that any who at all understand the

hiving of bees into a common straw hive can make no mistake or find any difficulty in performing it. Lest these pages should fall into the hands of persons who are not so acquainted, we will refer them to the directions already given at pages 21 and 72.

The hive may be smeared inside with a little honey, if at hand; but this is unimportant, as a clean hive answers well. Some older bee-keepers prefer to give a little dressing, to encourage the bees to like their new home.

After the swarm has been in the hive two weeks, the straw super hive may be put on, first removing the straw mat, to give the bees access to it. If the hive be a stock, that is, a swarm of the last or previous years, the super may be put on as soon as the weather is fine and warm, in May. But much depends on the weather and strength of the hive, as regards the time occupied by the bees in filling the super; in favourable weather a fortnight suffices.

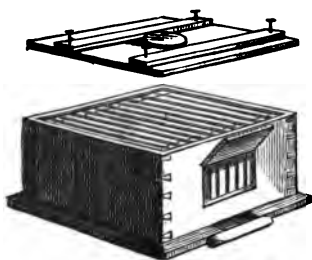
If, on looking in at the little window, the bee-master sees that the cells are sealed over, the cap of honey may be removed in the mode already described. The cells near the window are the last to be filled, so, when they are sealed, it is safe to conclude that the combs in the unseen parts are also finished.

Sometimes the queen ascends and deposits her eggs; if, on turning up the super, brood be visible, replace the cap for a few days, until the young bees quit their cells.

When thus emptied, honey will be deposited in lieu of the brood.

Suitable pedestals for these hives to stand upon may be obtained. It is important that these be firmly fixed, and the hive also made fast to the stand, to prevent its being blown over by high winds.

WOODBURY BAR AND FRAME HIVES.

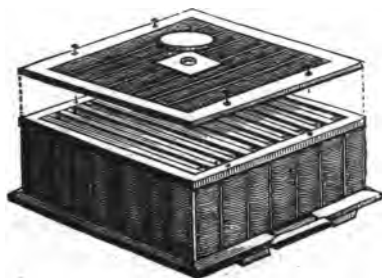


Mr. Woodbury's Bar and Frame Hive, as originally made, consists of a wooden box, fourteen and a half inches square inside, nine inches deep. This is a hive of large size, but the actual habitable space inside is lessened by the room occupied by the frames, of which there are ten; these rest on a rabbet a little below the surface, leaving a space of three-eighths of an inch between the upper side of the bars and the crown-board. This allows a free passage on the top for the bees, entirely obviating the necessity of making excavations in the crown-board, as has hitherto been recommended. Each frame is seven-eighths of an inch wide, and rests in notches, with a space of half an inch between each. The frames extend to within three-eighths of an inch of

WOODBURY BAR AND FRAME HIVE. 85

the floor-board, so as to hang without touching any part, leaving about the same distance from the sides. It will be seen that there is a free passage for the bees on every side, and they are thus kept from coming in contact with the sides of the hive. Our engraving shows the hive open, and exposes to view the top of the ten bars and frames, as they range from back to front. A window is also shown; this is placed in the engraving over the entrance, but the proper position would be just opposite. The drawing is made so as to show back and front at once. The floor-board is one and a quarter inch thick, having two "keys" on the under side to prevent warping.

WOODBURY STRAW BAR AND FRAME HIVE.



Since the introduction of the wood hive by Mr. Woodbury, that gentleman has recommended, in the *Journal of Horticulture*, that the stock-hive be made of straw, of

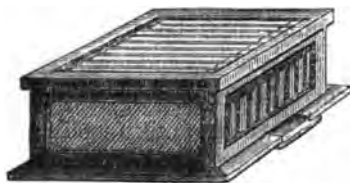
exactly the same dimensions ; this material being warmer in winter, slightly ventilating, and allowing of absorption. Bees, during cold weather, cluster together to generate the requisite degree of heat ; the temperature of the interior of the hive being thus so much higher than the external atmosphere, a good deal of moisture condenses at the top and on the sides of the hive. The straw, as before stated, prevents this dampness hanging about the hive, and tends to keep the inmates more healthy. Dampness in a hive is a fruitful source of mischief, causing empty combs to grow mouldy, and is injurious in many ways.

The square straw hives, and a machine for making them, exhibited in the Austrian department of the International Exhibition of 1862, suggested the idea of employing that material for English bar and frame hives. We have had a machine made somewhat similar to the one exhibited, and suited to the size of our hives, by which our hive-maker is able to manufacture neat square straw hives. These have a wood frame at top, an inch deep, with the requisite notches to allow the ten-comb frames to hang. A similar frame forms the base, the straw being worked between. The floor-board is one and a quarter inch thick, "keyed" with stout keys, as before mentioned. An inch projection is left on all sides beyond the exterior of the hive, from which it is slightly chamfered down. An entrance, four inches wide, is cut out of the substance of the board, beginning at

the edge, and continuing on the same level until inside the hive, where it slopes upwards. This entrance is about three-eighths of an inch high where the hive crosses it.

These straw hives have been generally made without windows, as Mr. Woodbury and other scientific apiarians so prefer them. They consider that glass windows are unsuited for winter, because then moisture condenses on the glass. There is no doubt that the having a peephole or two in a hive adds very agreeably to its value for amateur bee-keepers, and, to meet the wishes of such, we have had straw hives constructed with windows. It is not every one who would like to lift out the frames as often as is necessary for an inspection of the state of the colony, nor, perhaps, is it advisable to be often thus meddling. The windows have also a very neat appearance. We have hives with one, and some with two and three windows; of course, a little extra expense is incurred where these are made, but that is not objected to by those who approve of the additional convenience. The crown-board (if correct to call a straw top by that name) has, like the hive, a frame of wood all round, and a square piece of wood in the centre, with a two-inch hole; this hole is for the purpose of administering food, in a mode to be explained hereafter. A circular block of wood, four inches in diameter, closes the opening.

WOODBURY'S GLASS BAR AND FRAME HIVES.

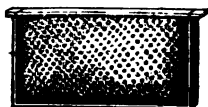


Some bee-keepers like to be able to make a full and daily inspection of the hive; we have, therefore, prepared a few hives, constructed of wooden frames, enclosed on all sides and on the top with window-glass. The dimensions are precisely the same as those before mentioned, and allow the same number of bars and frames (ten). The crown has a round hole cut in the glass to admit of feeding. The four sides are constructed of double glass, to preserve the bees from variations of temperature. We cannot, however, recommend this hive for a winter residence for the bees; we should prefer lifting the combs out with the bees, and placing them in a straw hive of similar construction, to pass through the ordeal of the winter season. A stock of bees might be kept through the year in a hive of this kind, but would require well wrapping round to keep out the cold. There should be a small glass over the hole at top, so as to allow the moisture to arise and condense, instead of doing so in the hive. The operation

of exchanging the hive is so easy, that we should be content to place a stock in one, say, from April to September, and shift it in the autumn. Such a hive is a very pleasing object of interest, as in it the whole commonwealth of bees is exposed to view ; and the hive need not be obscured from daylight, provided it be protected from sun and rain. All the external wood-work is of oak-colour, varnished, so that the appearance of the Glass Bar and Frame Hive is extremely neat and much approved of.

FRAMES.

As before mentioned, each stock-hive has ten of these frames—each thirteen inches long, by seven and a quarter inches high, with a five-eighths of an inch projection at each upper end, which rests in the notch, either back or front. The width, both of the bar and frame, is seven-eighths of an inch ; this is less, by a quarter of an inch, than the bar recommended by the older apiarians. Mr. Woodbury—whose authority on the modern plans for keeping bees is of great weight—finds the seven-eighths of an inch bar an improvement, because with them the combs are closer together, and require fewer bees to cover the brood. Then, too, in the same space that eight old-fashioned bars occupied, the narrower frames admit of an additional bar, so that, by using these, increased



accommodation is afforded for breeding and the storing of honey.

IMPROVED COMB BAR.



Section of Bar.

Mr. Woodbury says that this little contrivance has proved very effectual in securing straight combs when guide-combs are not obtainable. The lower angles are rounded off, whilst a central rib is added, of about one-eighth of an inch in breadth and depth.

This central rib extends to within half an inch of each end, where it is removed, in order to admit of the bar fitting into the usual notch. All that is necessary to ensure the regular formation of combs is, to coat the underneath surface of the central rib with melted wax. Mr. Woodbury further says: "My practice is to use plain bars whenever guide-combs are attainable, as those can be attached with much greater facility to a plain than to a ribbed bar; but whenever I put in a bar without comb, I always use one of the improved ones. By this method, crooked and irregular combs are altogether unknown in my apiary."

Most of our bars are made with the ridge; but should any of our customers prefer the flat ones, we keep a few to supply their requirements.

With the moveable bar and frame hive, every comb is available for extraction, and may easily be taken out of the hive; each comb being fixed within its frame,

there is less disturbance to the bees than if the combs were fixed to the sides, as is the case with ordinary hives. A strip of wood, about half an inch wide, rests on the floor-board; in this strip are ten notches, made to receive the lower part of the frames, so as to retain them in their places at equal distances from each other. A difficulty is found, with a well-stocked hive, in dropping the frames into the exact notches, so that it is not necessary to have these rack works always in use; but when any movement of the hive is made, it is essential to have the frames firmly fixed by the aid of this contrivance. It is also advisable to have the frames perpendicularly supported until the combs are built, so, in order that the frames should hang true, the hive ought to be on the level. A little inclination may be given to it from back to front, causing the hive to fall slightly towards the entrance, so as to allow the moisture inside the hive, caused by the exhalations of the bees, to run off.

COMPOUND BAR FRAME.

In the *Journal of Horticulture*, Mr. Woodbury thus describes the compound bar frame. Being his own adaptation, we cannot do



better than use his own words:—"This is a contrivance of my own, which I have found very advantageous in enabling me to use frames in stock-hives, and bars in

supers, without forfeiting the advantages arising from the unlimited interchangeability of every comb in every hive and super in the apiary. Its construction will be readily understood by an inspection of the annexed sketch, in which the comb bar is shown slightly raised from its frame. The bar itself is thirteen and a quarter inches long, by seven-eighths of an inch wide, and three-eighths of an inch thick. When the comb bar is in its place, the whole forms a frame thirteen inches long, by seven and a quarter inches high (inside measure), with five-eighths of an inch projection at each end, which rests in its appropriate notch in either the back or front of the hive. When filled with comb, the bar becomes so firmly cemented to the frame as to admit of its being handled with facility." This contrivance is, no doubt, very excellent in the hands of Mr. Woodbury; but in the hands of the unpractised severe mishaps may arise. In warm weather the propolis and wax, with which the bees cement the bar to the frame, become soft; consequently, in handling the frames, unless dexterity is used, the comb is likely to drop out. We therefore recommend that the bar and frame be made both in one: greater firmness and simplicity are thereby gained. Some of these compound bars and frames are kept in stock at our establishment, though they cannot be recommended for general use; but should anyone prefer them, they can be supplied at the same price as the common frames.

In describing the stock-hives of wood, straw, and

glass, allusion has frequently been made to the depriving hives technically called "supers." These are also made of glass, in wood frames, thirteen inches inside, six inches



deep, with eight bars (without frames). The above engraving represents the super used with the bar and frame hive.

Honey-combs in supers are better when made thicker than those for breeding, consequently the bars are placed a little further apart than in the lower or stock hive; they are either the Woodbury Ribbed, contrived to induce the straight building of combs, or flat bars with guide-combs affixed.

COVERS.

A loose outer case, forming a complete cover for the hive, is found very useful. The case is made in two parts, for convenience the roof is also separate, having an acorn at top, which forms a neat finish. These outside cases are made of wood, and drop lightly over all; when thus protected, and fixed on a pedestal, the hive

may be placed in the open air in such position as fancy may dictate. The aspect should be south or south-east, and, if against a wall, sufficient space must be allowed for a free passage behind, as it is from thence all operations must be conducted by the apiarian. The case and roof, with the stand, being the only parts exposed to the weather, will be the only portions that require painting; they are sometimes stained and varnished, and we are inclined to prefer the latter for appearance. Should the apiarian have a complete bee-hive house, the cover and stands will not be needed.



When removing or replacing the covers, care should be taken to do so very gently, or the bees will be enraged,

and rush out, and may inflict stings upon those within their reach. We have obviated the necessity for lifting off the cover for the purpose of looking in, either at the window of the stock-hive or of the super, by making a door, both in the upper and lower parts of the outside case. These doors, or unglazed windows, are hinged at the bottom, so as to open downwards, rendering inspection easy, without disturbance to the bees.

A wooden range for supporting a number of hives makes a safe and economical stand: it may be formed by driving firmly into the ground two rows of posts, each row about twelve inches apart; to these two rails, about two inches square, are nailed, and upon these the hives firmly rest. Care should be taken not to have the hives nearer together than eighteen inches; the intermediate space will be found very convenient on which to rest the cover, or for supporting an empty hive during the proper performance of any operation.

Mr. Woodbury has his hives arranged on rails, somewhat after the plan before described.

In describing, as above, the various hives and frames, some hints have been given as to the methods of handling them. This, however, will not suffice for an induction to the mysteries of practical bee-keeping, and we must refer the reader to a subsequent section, wherein the details as to manipulation will be fully explained, and the results of the experience of several distinguished apiarians will be embodied.

TAYLOR'S IMPROVED COTTAGE HIVE.

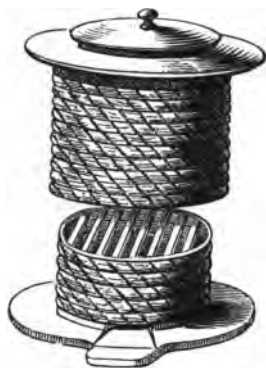


This hive is similar in principle to the cottager's. It is also similar in size, with the exception of being quite straight at the sides. A zinc rim affords protection from the weather. Under the upper straw hive a bell-glass is worked. A mahogany adapting board, with a four-inch hole in the centre, corresponding with that of the hive, supplies an even surface for the glass to rest on, and facilitates its removal when full. For particulars as to stocking and management, see directions for cottager's and improved cottage hives, pages 72 and 83.

EIGHT-BAR STRAW HIVE.

This is an ingenious contrivance of Mr. Taylor's. Hoops are worked in the straw, both at the top and

bottom of the stock-hive, and in the upper hoop are openings cut to receive eight comb bars; each bar is one inch and an eighth wide, with a space of half an inch between. Since the introduction of square straw bar and frame hives, these hives have not been much in request. Considerable inconvenience is found to arise, because the bars, being of unequal lengths, cannot be interchanged one with the other.



The description given of Taylor's Amateur Hive, and mode of stocking and furnishing it with guide-comb, apply to this hive. The large straw hive raised up in the engraving is an outside case; the roof is a large zinc cover. If placed in a bee-house, the outside case and zinc roof are not required.

NEIGHBOUR'S UNICOMB OBSERVATORY HIVE.

This hive is well adapted for those persons who are desirous of having the opportunity of closely examining the workmanship of the industrious and interesting inmates. It is particularly intended for a window recess or an indoor apiary, and will also be found an interest-

ing addition to the green-house. Bees cease to appear disturbed when exposure to the light is continuous. This discovery enables the bee-keeper to gain a full inspection. The hive should be screened from the direct rays of the sun, which would worry the inmates, and be otherwise prejudicial. An aperture should be cut in the ~~sash~~ corresponding with the entrance to the hive, through which the bees may find egress and ingress, without being able to gain access to the apartment, as described for the ladies' observatory hive (page 78).



The unicombed hive is constructed of so narrow a width between thin plates of glass that it admits of one comb *only* to be built, and, at the same time, leaves space between the comb and the glass on either side for the bees to pass and repass. It is thus made so that every bee may be exposed to view. The queen forming the most prominent feature of attention, she is readily

distinguished by the greater length of her body, as well as by the attention paid her by the other bees.

The mode of stocking this hive is as follows :—Procure a strong swarm, if practicable, and let it be first hived into a common straw hive in the usual way. Take care to make the necessary preparations previous to the operation of stocking : for this purpose, at evening time, place the hive on its side, on the ground (having already spread a sheet, or large white cloth, underneath) ; unfasten the side of the hive which is hinged, turn this sash quite back, very gently lift the straw hive containing the swarm ; then, with a sudden shake, dash as large a portion of the bees into the unicombe hive as can be done in a few seconds. Have ready a feather or, better still (because firmer), a goose-wing ; with this, quickly brush the bees off the edges of the frames, also from the rabbets against which the glass side closes, in order to prevent killing any ; then gently spread them, so that the glass, when closed, shall not shut against the congregated mass in the middle. When thus ready for closing up, which should be quickly done, fasten the side, and turn the hive right end upwards, with the entrance towards those bees that are outside. The bees will not, probably, have all been ejected from the straw hive at the first brush, and will require a few sharp raps on the cloth to clear the hive. The moving mass now congregating without, upon discovering that so large a portion of their companions

have found a home, with (as is generally the case) the queen safely housed, will hasten to join them. It is a pretty sight to see the labourers crowding in like a little army, with their heads pointing in the same direction, making for the desired home, which they will slowly but surely enter, with fanning wings and a happy hum.

Considerable help may be afforded by gently collecting the stragglers in a table-spoon, and shaking them off close to the entrance.

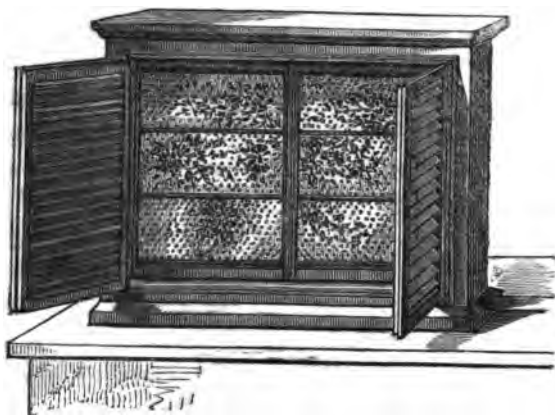
In about an hour, all the bees will have entered the hive, which may now be bodily taken to the place previously made ready for it, and which it is intended permanently to occupy,—a shelf, the size of the bottom of the hive, with a sloping piece of wood four inches wide, forms a firm bracket and a substantial stand,—these and all other preparations, such as cutting the opening, fixing the alighting-board, &c., having been previously accomplished when the hive was empty.

It will be as well to screen the hive from view for a few days, until the bees become settled in their new domicile. Although this hive is constructed of double glass, to keep up a more uniform degree of warmth, still, from the cold nature of glass, and the close contact into which the bees are brought with it, it is advisable to place flannel between the outer shutters and the glass of the hive, on both sides. Such precaution is found essential if the bees remain in this hive during winter, and very much adds to their comfort on cold nights at most

periods of the year. In the day time, in summer months, the hive being of double glass, the whole may be fully exposed to view. If the temperature of the apartment in which the hive stands be kept at 60 degrees, this extra attention will not be so needful. As soon as the bees are settled, comb-building will immediately commence, and in about two weeks' time there will be comb spreading over the whole hive. The queen may be viewed depositing her eggs, and all the usual operations of the rearing of brood, storing of honey, and the building of combs, will be open to full inspection, with perfect ease to the spectator. As an object of lively and permanent interest for the breakfast-parlour or conservatory, the unicombed observatory hive may be regarded as infinitely superior to an aquarium or fernery.

At the Exposition Universelle of 1855, in Paris, we exhibited a hive of this description in full working order. The bees left London on the 5th of July of that year, and were placed in the Exposition on the following morning. An entrance was made for them through the side of the building, as before explained. Our bees had no national antipathies, and they immediately sallied forth to their "fresh fields and pastures new" in the Champs Elysées, the gardens of the Tuileries, the Luxembourg, &c., whence they soon returned laden with luscious store from French flowers.

The Jurors of the Exposition awarded us a prize medal for bee-hives.

WOODBURY UNICOMB HIVE.

The Woodbury Unicombe Hive has many advantages over similar hives as previously constructed. The engraving shows the interior compartment divided into six; these are six Woodbury frames. The inner sash opens, to admit of hanging up the frames on the notches prepared for them. The width of the hive between the glasses of the sashes is just sufficient to admit of one thickness of comb, with space on each side for the bees to pass and repass, the same as in Neighbour's unicombe. There is, however, a great advantage in the use of this hive; with it, anyone possessing a Woodbury box or straw bar and frame hive

can readily commence an uncomb, and as readily put the combs and bees back into the square hive again. The outside shutters on each side are composed of Venetian blinds, admitting daylight, but obscuring the rays of the sun. We had the entrance made at one end, as represented in our drawing ; this alteration was made after the pattern of the hive from which Mr. Woodbury allowed us to copy. His own was intended to stand wholly out of doors, and had two central entrances, one on each side at the bottom, the hive itself turning on a pivot.

When the hive was being examined on one side, the entrance was closed by a piece of wood inserted in it ; and when the other side was brought round to be inspected, the piece of wood was withdrawn, and placed in the opposite entrance. This was a most ingenious contrivance ; but it did not answer our purpose for indoors. When Mr. Woodbury sent us his hive, we were preparing for the International Exhibition of 1862, and, in placing it against the sides of the building, we followed our old plan for ingress by having the entrance at the end. Since that time, we have made a considerable improvement by adapting Mr. Woodbury's cleverly contrived turn-table to suit our own hive. Like Mr. Woodbury's hive, ours has two iron wheels, the one fixed to the bottom of the hive, the other fixed to a stout board running the full length of the hive ; on these two wheels the whole hive turns. In the centre there is an opening

into the hive, with a passage-way running underneath, so that the bees' entrance is in no way affected by the position of the hive, which revolves, to suit the convenience of visitors inspecting it. Should the queen, with her attendants, not be visible on one side, the other side of the comb can be brought into full view, and examined with the same facility as a picture, or as articles are inspected in a shop window. Thus, in the unicom observatory hive, the sovereign mother, her train of servitors, the drones, with their aimless movements, and the crowd of ever-busy workers—either building their combs or storing honey—may be always seen, as presenting a veritable *tableau vivant*.

Another improvement that we have made upon Mr. Woodbury's pattern is, that of accommodating the frames; his was constructed before frame-hives were in use, consequently it is only suitable for combs on bars. Our adaptation has necessitated an increase in size. The outside dimensions are nearly three feet square, and seven inches deep from back to front. Provision is made at top for feeding, and for working two small flat-top glasses for deprivation, which are protected by the weather-board.

An alighting-board is placed at the centre, close under the entrance, when the hive is located out-of-doors. When the hive is placed indoors, a passage-way, about eighteen inches long, covered with glass, is fixed to the entrance, the other end communicating with an

opening in the wall or sash ; through this the bees find access, an alighting-board being fixed outside the building. It is requisite that the passage-way be about this length, in order to allow the hive to turn round clear of the side of the building.

In the summer of 1863, we had ample proof of the success of this hive during its exhibition at the annual show of the Bath and West of England Agricultural Society at Exeter.* We selected six combs, and packed them in one of the square box Woodbury bar and frame hives, and, on arrival at Exeter, Mr. Woodbury assisted us in taking out the frames and placing them in the unicombe. That being fixed against the boarded side of a shed, we found the covered way a great convenience, and it answered remarkably well ; the bees did not seem to be inconvenienced by having to travel through so long a passage. A glass covering admitted

* It may require explanation how it was that we took bees to Exeter, which sounds something like "carrying coals to Newcastle." The reason was this—the garden of our friend, Mr. Woodbury, at Mount Radford, from which we could have been supplied, was so near to the show yard, that he was apprehensive a large number of the bees would return to their old hives. Our bees from a distance would, according to their nature, return to their own hive, for bees, although they may be moved miles away, take care to mark their new position, and are careful to return to it. Mr. Woodbury lent us a small stock of his Ligurian bees, and between it and our own hive the crowd of visitors divided their attention.

a full view of the little labourers as they crowded in, and the sight of them very much enhanced the interest of visitors examining the hive.

Since the time before mentioned, we have exhibited bees at the meetings of the Bath and West of England Agricultural Society at Bristol, and of the Royal Agricultural Society at Newcastle, in 1864. On both occasions, further proof was given that this hive admirably answers the purpose intended, and it afforded pleasure and interest to many thousands of visitors.

The unicomb hive may be stocked in two ways, which have been previously referred to. The bee-keeper may either select the comb upon which the queen is found, and put it into the hive, and so form an artificial swarm, or he may take six brood-combs from a hive, and so stock the unicomb at once, which we did for the show at Exeter.

The former plan is, perhaps, the most advisable, because new comb has to be built within the five frames; for, be it remembered, in this case five empty frames must be put in. It is a better plan still, if artificial combs are placed in each frame, so as to afford an interesting opportunity of watching the formation of the cells therein. The combs are sure to be dark in colour when taken from a stock-hive, and new combs, being whiter, have a better appearance in the hive. The comb upon which the queen was introduced may be taken away after the artificial swarm has made combs within some

of the other five frames; when the queen is on one of the new combs, opportunity may easily be taken for opening the hive and removing the old dark comb. The bees can easily be shaken or brushed off the comb, and will return to the hive. The comb, with the unhatched brood, may be deposited in any square hive that needs strengthening. We mention this, to show how to obtain a hive with entirely fine white comb.

If the possessor of a square Woodbury frame-hive wishes to start a strong unicombed hive, and does not object to appropriate the stock, he must take out of the Woodbury hive any six combs on the frames, and put the unicombed in its place so as to receive all the returning bees that happen to be abroad; the remaining four combs, supposing there are ten, can be inserted in any other frame-hives in the garden in which there may be vacancies.

We have had this hive in operation, in the manner last described, during the summer of 1863, and found it to answer remarkably well. On a lawn, placed on a suitable ornamental stand, it formed a pleasing object, besides affording great interest and instruction.

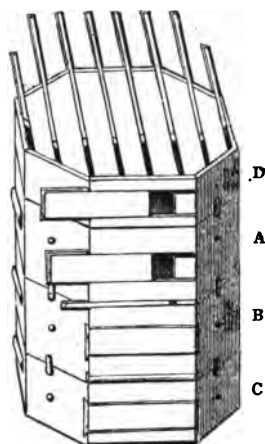
In unicombed hives stocked with a natural swarm (as is generally the plan), there is considerable difficulty in keeping the bees alive through the winter. In a hive where the combs are removable, no loss of bees need be occasioned. We do not recommend the hive we are now describing as a winter residence for bees. For

four months in the year, when bees are most active, and when their operations are most interesting, this hive may be brought into use, either of the two plans before described being adopted. An artificial swarm should be put in during May or June, and taken out, in the method before mentioned, and then placed in the square box during the month of September; sometimes it may do for a stock to be put in a month or so earlier, but it should never be retained later in this hive. In October, we often have cold nights; the bees and brood being in such close contact with the glass, and not able to cluster as is their natural wont, suffer from exposure to the variations of temperature. In some degree to moderate this, we have used treble glass with a space between each square; greater warmth is thus obtained, and the view is not intercepted. Opportunity should be taken for cleaning the unicombe hive when empty, so as to be ready for re-stocking as a new hive in the following summer. The unicombe observatory hive is one which might have been suggested by the lines of Evans:—

“ By this blest art our ravished eyes behold
The singing masons build their roofs of gold,
And mingling multitudes perplex the view,
Yet all in order apt their tasks pursue;
Still happier they whose favoured ken hath seen
Pace slow and silent round, the state's fair queen.”

THE STEWARTON, OR AYRSHIRE HIVE.

The Stewarton Hive is so often spoken of, and in such favourable terms, by bee-keepers, that we deem it necessary to give it a place here, and to supply some explanation of its construction and management. We consider this especially needful, as some of the principles of its management are so imperfectly understood, that frequent mistakes are made, and also because, for the convenience of bee-keepers, we keep a supply of these hives on hand.



The name is derived from their having been first manufactured at Stewarton, in Scotland; and they are still made so well, and at so moderate a price in that country, that London workmen are unable to compete in their manufacture. Our supply is therefore from that source; so that, with a little addition for carriage, the price approximates that of the makers themselves, affording a convenience to many of our apiarian friends in being able to obtain these hives in London.

Our engraving shows the four boxes set up. These constitute the hive. We will suppose that the young

bee-keeper has just received the four octagonal boxes, with the bundles of grooved slides (of which there are nearly forty); about one half of these slides are short pieces, similarly cut to the longer ones. These are to fill up the openings where the slides are not put in, or are required to be withdrawn, as hereafter explained. He will find himself in possession of four boxes so neatly dove-tailed on the bevel, that, if he be of a mechanical turn, he will not only be surprised at the way in which they are put together, but also at the price for which they are offered. Three of the boxes, A, B, C, technically called "body boxes," are precisely similar, each being fourteen inches in diameter and five and a half inches deep inside. Nine bars range along the top of each box. These are not movable, but are so constructed to induce the correct and regular building of the combs. The fourth box, D, is the depriving box or super, is only four inches deep, and the same in diameter as the others. This being the honey-box, it is furnished with seven wide fixed bars, instead of nine, because, as stated at page 93, bees construct deeper receptacles to contain the honey than for breeding in: thus, should the queen go up into this compartment, she may find the cells are too much elongated to enable her to reach the base, when her body is inserted for the purpose of depositing an egg. We have too much confidence in her majesty's sagacity to expect her to make such an attempt in honey-cells thus elongated; doubtless she will only look and

pass on, seeking more suitable depositories, and confine her nursery to those lower regions where she is welcome. The honey is thus kept pure, and that which not unfrequently mars the quality of a super—viz., cells that either contain brood or have been bred in—is prevented. Each box is furnished with two small windows, back and front, closed by sliding shutters, by which opportunity is afforded for inspecting the progress made, and also of knowing when the time has arrived that the cells are filled and the box may be taken away.

Each of the boxes, *A*, *B*, *C*, is furnished with an entrance-way, four inches wide, half an inch high, a wooden slide either wholly or partially closing same, as required. When at work, the bees only need one entrance open, and that at the lowest box. The long slides before mentioned are pushed in to their respective receptacles from the back of the hive, to close the openings between the bars; those of them that are shorter will be seen to belong to the sides, of the octagon, and the ends are cut angular to suit the form of the box. A little examination will suffice to show the right allotment of the slides, the appropriation of which may be said somewhat to resemble the putting together of a child's puzzle.

The box *B* must be left open at the interstices that correspond with the box *A*, placed above, the little openings being closed by the insertion of the ten sections of slides, thus leaving free communication inside with the upper

box A, and admitting of no outlet for the bees, except at the entrance.

When the four boxes are placed above each other, the structure measures twenty-two inches high.

The Scotch carpenters send no floor-board, and no covering or roof for the top to shoot off the rain ; they evidently expect that the purchaser is provided with a shed or bee-house of some kind, and also with a floor-board. Should the apiarian, however, not have these necessities, we can supply the deficiency.

The sides of the boxes are furnished with wooden buttons, which, when turned round, keep each box exactly in its place above the other : there are also projecting irons or screw heads for tying the two boxes A and B together, preparatory to hiving the swarm ; or if the boxes stand out exposed, all may be thus secured, to prevent their being blown over by high winds.

Directions for Management.

Take the two boxes A and B, made one by the junction before mentioned, and similarly inside by the free communication afforded. Shake the swarm in as described at page 28, just as with a common cottage hive.

If the weather be favourable, these two boxes will be nearly filled in ten days. To get the full advantage of the Stewarton hive the first year, put two swarms into

STEWARTON, OR Ayrshire HIVE. 113

two body boxes, A and B; if the two are too small, then add the other box c. Allow the bees to remain there till they have nearly filled the body boxes with comb, which (with this increased number of workers, and in favourable weather) should be from five to ten days. Two swarms are seldom procurable the same day, so as then to be joined together, and even if they were, there is a doubt whether greater progress may not be attained by hiving a swarm a week or so earlier than the other, so as to build comb and raise brood ready for the reception of the new comers.

The second swarm is added best in the evening, after the bees have ceased working. For this purpose spread a sheet on the ground, place two sticks so as to prevent the box being close to the ground, then, with a sudden knock, eject the bees of the second swarm on to the cloth, and place the two body boxes that contain the earlier swarm over the dislodged bees; these will, in the course of an hour or so, ascend and become one family, and one of the queens will be speedily destroyed.

In the meantime, prepare the shallow honey-box n, by fixing small pieces of worker guide-comb, of pure white colour, on the centre of each side bar. If, however, a box of honey with neatly made, straight, and quite regular comb be desired, a piece of this guide-comb must be fixed to the centre of each bar. If guide-comb be unobtainable, strips of the impressed wax sheets

or artificial comb (hereafter described) will be found excellent substitutes.*

When selecting guide-comb, avoid combs with drone-cells; to fix these is setting the bees a bad pattern. Honey stored in drone-combs has more wax, and is coarser in appearance and taste. Having satisfied yourself, by peeping in at the windows, and from symptoms at the entrance, that the original boxes are well filled, place your prepared honey-box on the top, draw a slide at each side of the middle box to afford communication, and insert the little plugs. It is not so well to withdraw the middle slides, because the queen is more likely to ascend from the centre. When you notice that the bees have fairly commenced work in the honey-box and are likely to keep to it, the remaining box c may be added below the stock, which will afford additional room and prevent swarming, exchanging the entrance to the newly-furnished box and sliding in pieces wood to close the aperture of that above.

Should the bees begin making comb in the bottom box, draw two more slides for freer access into the super, as there will then be little risk of the queen ascending, having so much range for egg-laying in the three lower boxes.

In very fine weather, a good swarm or stock will fill a honey-box in the space of two weeks; but a much longer time is usually occupied.

* The body boxes may be prepared in a similar manner.

The more quickly the box is filled, the purer will be the colour of the comb and honey, because bees very much discolour their work when they have it long on hand. Before taking off the honey-box, observe particularly that the combs are well sealed at the windows, because, as mentioned at page 83, this portion of the work is always left till the last.

When you see that all is ready for the removal of a box, select the middle of a fine day for the purpose (not omitting to don the bee-armour). Draw out one or two of the slides, and give the bees a few gentle puffs, either of fungus or of tobacco smoke, from the tube fumigator, which will cause the majority of the bees to descend into the body of the hive; then stop the communication, by pushing in the slides. Next, with a spatula, make a slight opening for a piece of strong thin twine at the front of the box, and immediately behind the thread two thin wedges; with the two ends in hand, work the twine gently forward, bringing the wedges after, until the opposite side is reached. This will remove any obstruction caused by the bees having attached their combs to the top of the next box, and thus leave the super entirely free for removal. It will be as well, for the reasons stated at page 58, not to remove the box immediately. After waiting an hour, the box may be taken off, and conveyed to a quiet place. Should any bees remain, they will be glad, after their confinement, to escape to the parent

hive; or if you have an empty hive to put over, by gently drumming the sides, the remaining bees will ascend and leave the box at your disposal. The bees driven into the empty box may now be shaken out in front of the mouth of the hive. Another plan is to cut off the communication over night, and raise the hive on wedges, as recommended to be adopted with the super (page 73).

Before winter sets in, the box c may be removed and the comb it contains (if well filled) be used for consumption: if the comb be empty, let it remain carefully preserved from moth and insects; it will be invaluable next season. Empty comb may be thus preserved by tying or pasting a piece of stout newspaper closely round the bottom, and keeping the box in a dry place.

Feeding, when required, may be liberally pursued, by withdrawing two slides and supplying a bottle-feeder. Enough food should be given in the early autumn to last until spring.

The chief value of the Stewarton hive consists in the boxes being shallow, so that the combs are more likely to be well filled down to the base. This is a great advantage with supers, particularly when required to be sent to a distance, as there is less likelihood of the combs breaking down. A fine super of honey, that would be valuable, is materially depreciated when it reaches its destination in a damaged state, with the honey running from the cells. For the same reason, when the weather is hot and the rays of the sun fall on the hive, the combs

might part from their foundations if there were no intermediate bars, which is now the case in the stock-hive, composed as it is of two boxes. If these two boxes were in one, the depth of each comb would be twelve inches; and when filled with brood and honey, would probably weigh 10 lbs. This is a great weight to be supported in hot summer weather, when the wax is softened by the heat. Another distinguishing feature that the Stewarton hive possesses is the use of the box c, which, by giving increased room, as the season advances, prevents what is often an annoyance to the apiarian, viz., a late swarm—too late to be of any value, and impoverishing the stock by a division of its numbers, thereby perhaps impeding the completion of the super. A further advantage of the box c, is that it induces the bees (who frequently hang in clusters about the entrance) to carry on their labours instead of remaining in enforced idleness.

We often receive from Scotland magnificent boxes of honey; the fine quality is no doubt to be attributed to good pasturage, and to the fact of keeping the stocks strong (see page 19), by adopting the means before hinted at, and thus having hives well stored and well populated early in the season, so that they may betimes take full advantage of supplies of nectar in the flowers. Early honey is generally the best in colour.

The old proverb runs:—"It is the early bird that finds the worm." The hive that is strong is certain to produce the most honey. To make this plain, we will suppose

that a bee-keeper has a weakly hive ; it will take some weeks, if not months, to grow populous ; and as soon as the strength of the hive has recovered, the honey season will have advanced, if not ended, whilst the strong stocks have been able to take full advantage of the supplies, having an abundance of labourers to collect the honey and store it in supers for their master. To induce the bees to build quickly, cover up the super with as much warm woollen covering as you can, as recommended for glasses, page 65.

In fine seasons, and under good management, extra supers and body boxes (the latter to be used as "nadirs") may be required to place above and below the supers and nadirs partly filled, in order to reap the full benefit of the honey season ; for with strong colonies one box after another may be inserted, till the whole towers from six to ten boxes high. This plan is, indeed, collecting honey while the sun shines, but requires a greater amount of apiarian skill and good pasturage to carry on in its entirety than is generally possessed. In other words, we in the south may find it difficult to rival our accomplished brother-apiarians north of the Tweed, for they do wonders with the Stewarton hive.

HUBER'S HIVE.

To Francis Huber—not improperly styled the "Prince of Apiarians"—we are indebted for more extensive and

accurate observations on the habits of the bee than have been contributed by all other observers since the time of Aristotle.

During the early period of Huber's investigations, he prosecuted them by means of single-comb hives, which allow of each side of the comb being examined. He found, however, that there was one important defect. The bees could not in these hives cluster together, which is their natural method of withstanding the effects of a reduced temperature. Huber hit upon the ingenious expedient of combining a number of single-comb frames, so as to form one complete hive, which could be opened, in order to expose any particular comb, without disturbing the rest. From the manner of the opening and closing of this hive, it has generally been called the "Leaf or Book Hive." The division separating each comb is joined both back and front with "butt hinges," fastened with a movable pin, on withdrawing which, at either side, each comb and the bees on it may be inspected as easily as if in a single-comb hive. Huber's leaf hive is thus in appearance, as if several ordinary "History of England" backgammon chess-boards were set up on end together. The floor-board on which the hive stands is larger than the hive when closed, so as to allow of its being opened freely at any particular "volume." An entrance-way for the bees is hollowed out of the floor-board as in other hives. There is a

glass window in each end of the hive, which is provided with a shutter.

There is, however, one serious objection to Huber's hive, which, though not noticed by him or his careful assistant, has prevented its general use—that is, the difficulty there is in closing it without crushing some of the bees—a catastrophe which, by exasperating their comrades, is certain to interfere with any experiments. There is no such risk in the bar and frame hive, whilst in it every facility possessed by Huber's is retained; so that we strongly recommend scientific apiarians to use some kind of bar and frame hive in preference to Huber's. We have here introduced a description of Huber's leaf hive (and should be glad to exhibit one) for the sake of its historic interest in connection with apiarian science. The invention was invaluable for Huber himself, and it suggested to other apiarians the adoption of the present plan of vertical bars and frames.

The character of Huber and the circumstances under which he pursued his observations are so remarkable, that we need scarcely apologize for stating a few particulars respecting him here. He was born at Geneva, in July, 1750, his family being in honourable station and noted for talent. Just as he attained to manhood he lost his sight, and remained blind to the end of his days. This apparently insuperable obstacle in the way of scientific observation was overcome by the remarkable

fidelity with which Burnens, his assistant, watched the bees and reported their movements to Huber. Madame Huber also, who, betrothed to him before his calamity, had remained constant in her affection, assisted in the investigations with great assiduity during their long and happy wedded life. We quote the following from "Memoirs of Huber," by Professor de Candolle :—

"We have seen the blind shine as poets, and distinguish themselves as philosophers, musicians, and calculators; but it was reserved for Huber to give a lustre to his class in the sciences of observation, and on objects so minute that the most clear-sighted observer can scarcely perceive them. The reading of the works of Reaumur and Bonnet, and the conversation of the latter, directed his curiosity to the history of the bees. His habitual residence in the country inspired him with the desire, first of verifying some facts, then of filling some blanks in their history; but this kind of observation required not only the use of such an instrument as the optician must furnish, but an intelligent assistant, who alone could adjust it to its use. He had then a servant named Francis Burnens, remarkable for his sagacity and for the devotion he bore his master. Huber practised him in the art of observation, directed him to his researches by questions adroitly combined, and, aided by the recollections of his youth and by the testimonies of his wife and friends, he rectified the assertions of his assistant, and became enabled to form in his own mind

a true and perfect image of the manifest facts. 'I am much more certain,' said he, smiling, to a scientific friend, 'of what I state than you are, for you publish what your own eyes only have seen, while I take the mean among many witnesses.' This is, doubtless, very plausible reasoning, but very few persons will by it be rendered distrustful of their own eyesight."

The results of Huber's observations were published in 1792, in the form of letters to Ch. Bonnet, under the title of "*Nouvelles Observations sur les Abeilles.*" This work made a strong impression upon many naturalists, not only because of the novelty of the facts stated and the excellent inductive reasoning employed, but also on account of the rigorous accuracy of the observations recorded, when it was considered with what an extraordinary difficulty the author had to struggle.

Huber retained the clear faculties of his observant mind until his death, which took place on the 22nd of December, 1831. Most of the facts relating to the impregnation of the queen, the formation of cells, and the whole economy of the bee-community, as discovered and described by Huber, have received full confirmation from the investigations of succeeding naturalists.

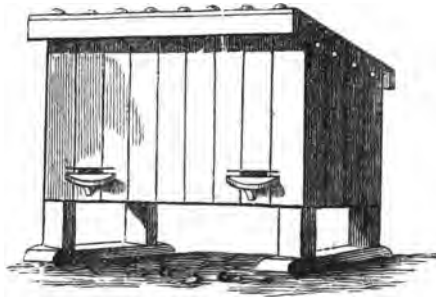




IV.—EXTERIOR ARRANGEMENTS AND APPARATUS.

BEE-HOUSE TO CONTAIN TWO HIVES.

THERE is no contrivance for protecting hives from the weather so complete as a bee-house: one which also admits of an easy inspection of the hives ranged therein is especially convenient for lady bee-keepers.



Front View of Bee House.

The folding doors behind the bee-house have only to be opened, and the hives are at once exposed to full

view; then, by raising the upper hive or cover, the glasses may be deliberately inspected without molestation from the bees, and the progress made by the busy multitude in building and filling their combs may be watched by the bee-keeper, from day to day, with great and increasing interest. Under the roof on each side are openings to act as ventilators, to allow the heated air to escape. With the sun shining on the house and no escape of this kind, the heat would be retained inside, and the temperature become that of an oven.



Here our engraving shows the back view of the beehouse, the interior being furnished with two of our improved cottage hives. Two suspended weights will be noticed; these are to balance the top hives which cover

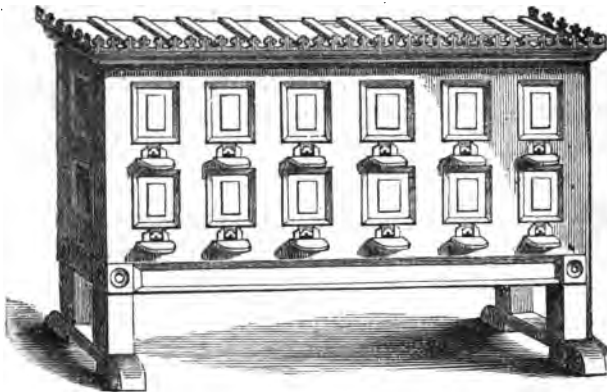
the glasses; the cord for each runs on pulleys, so that the covers can be easily raised and as easily shut down again when the inspection is finished. We may here remark, that it is not well to keep the glasses long exposed to full light and view.

The front of the bee-house being closely boarded, a passage-way is contrived for the bees, by which they have egress and ingress, without being able to gain access to the house. The hives must be kept close to the front boarding of the house, to prevent the opening of any crevices which the bees might mistake for the entrance to their hives, and so find their way into the house. The front view of this bee-house shows the ordinary contrivance for entrance; the sliding zinc entrances may also be advantageously fixed, as shown in the engraving of a bee-house to contain twelve hives. In many parts of the country, hives and honey are sometimes stolen from the garden; the bee-houses we furnish have a lock and key to prevent depredations of this kind.

Care must be taken to keep the bee-houses free from spiders and other insects. In some districts, ants are numerous and troublesome. The plan we recommend for excluding them is to put some pitch round the four supports of the bee-house, or, better still, strips of loose flannel, or other woollen material that is absorbent, which have previously been soaked in lamp oil. We use sperm oil, as being the slowest-drying oil we know

of. A piece of string will keep the flannel close to the wood [and then neither ant nor other insect will pass up ; so that by this simple means the hives may, so to speak, be insulated, and placed beyond their reach. As the oil dries up, it can easily be renewed. We have found this an effectual remedy against these insidious enemies of bees.

[BEE-HOUSE TO CONTAIN TWELVE HIVES.

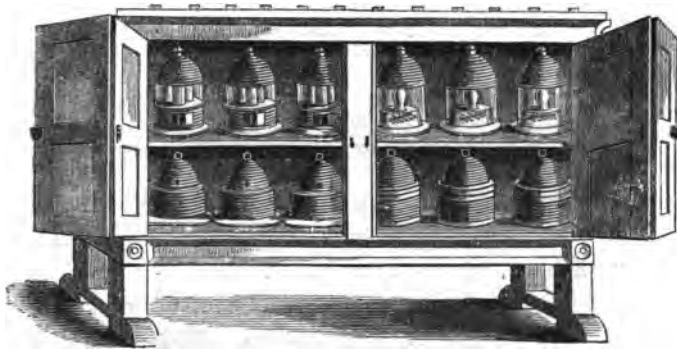


Where economy of room is a consideration, we fit up beehouses with a double row of hives, one above the other. Our engravings show the back and front of a house of this kind, having an ornamental zinc gutter to prevent the wet from dripping on to the alighting-board.

When a number of hives are thus together, we colour the alighting-boards differently, so that the bees may

BEE-HOUSE FOR TWELVE HIVES. 127

have a distinctive mark by which each may know its own home, and not wander into its neighbour's house. Bees readily enough receive a honey-laden labourer into a hive; but if the wanderer be poor and empty, he will be promptly repulsed, and may have to forfeit his life for his mistake. Queens returning from their wedding



Back view of Bee-house, showing the Interior.

trip are liable to mistake their hive if all the entrances are so much alike that a noticeable difference is not easily aparent. A queen entering a hive already supplied with a fruitful sovereign would be certain to be killed. The loss to the hive to which the queen belonged is a serious one. Hives are often made queenless from this cause, and thereby reduced to utter ruin, the bee-master perhaps attributing his failure to something altogether different.

BEE-HOUSE TO CONTAIN NINE HIVES.



This engraving represents a bee-house adapted for having a number of hives in a limited space,—three rows of hives, one above the other.

We do not recommend a bee-house of this construction; it is difficult to erect one to afford space for super hives, without its being so inconveniently high as to be liable to be blown over by strong winds.

Hives thus located in a bee-house are not exposed to so much change of temperature, and the stocks generally pass the winter well.

Here we may introduce the meditations of a German apiarian, who describes the advantages of a bee-house for the bees, and his own pleasure in watching over his pets in the winter, as they dwell so comfortably and safely. It is true that Herr Braun associates still choicer delights with the simple pleasures of bee-keeping, but

EVENING THOUGHTS IN JANUARY. 129

as Mr. Woodbury has not excluded the higher theme from his translation, we need not hesitate to quote the whole:—

EVENING THOUGHTS IN JANUARY.

(Translated from the German of ADALBERT BRAUN.)

BY A DEVONSHIRE BEE-KEEPER.

WITHIN my little garden
Stands also a bee-house,
And bees therein protected
From sly tomtit or mouse.

How quietly they're sitting !
And little trouble give,
Beyond the needful watching
That undisturbed they live—

That all, indeed, are living
In strong, unbroken health,
And, in the brood-nest hanging,
Consume their hoarded wealth—

That in the dwindling store-room
Sufficient stores remain,
Until the rape-plant donneth
Its blossom-dress again !

Thus daily do I visit
My garden and my bees,
Neglecting thereby often
My dinner and my ease.

Thank God ! they all were humming
Within their hives to-day ;
Nor could I find a symptom
Of hunger or decay.

THE APIARY.

And yet what ardent longing
I feel, O Spring, for thee!
My darlings' gleesome frolics
Are happiness to me!

How would this anxious longing
Consume my very breast,
But for a little being
So full of love and jest,

In heat or cold that prattles
Around me ev'ry day,
And still, the throes of longing
By commune blithe and gay.

Ye bee-keepers can value
A joy that is complete;
It is my wife—the darling
Whose lips are honey-sweet.

With e'en the richest bee-stand
Were joy and pleasure gone,
If my heart's queen were wanting
And I left here alone.

Thus, her I love and honour,
No difference have we,
But oftentimes go together
Our little pets to see.

Her kisses sweet removing
All sorrow from my breast,
And honied joys surrounding
Proclaim us highly blest.

Mount Radford, Exeter.

T. W. WOODBURY.

ORNAMENTAL ZINC COVER.

The annexed engraving of the Ornamental Zinc Cover renders but little description necessary. The illustration shows one of our improved cottage hives on a stand. Three clumps of wood must be driven into the ground, and the three iron rods supporting the covering made fast to them with screws; there are screw holes in the feet of the iron rods for the purpose. When thus secured, but little fear need be entertained of its being blown over by high winds.



In the roof two pulleys are fixed, so that, by attaching a cord, the upper hive covering the bell-glass supers may be raised with facility for the purpose of observing the progress made by the bees.

The ornamental zinc cover will form a pleasing object in the flower-garden, when placed in a suitable position

on the grass plot. It is painted green ; the iron rods are of such a length as to support the roof at a convenient height from the ground.

ZINC COVER.



This is a simple and inexpensive covering for any cottage straw hive when exposed in the garden. It fits close on to the upper hive, coming sufficiently low to protect it from sun and rain, without obscuring the whole hive.

These covers are painted green—a colour that is generally preferred.

TAYLOR'S ZINC COVER.

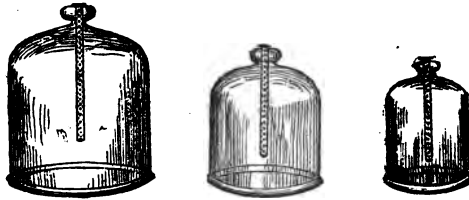


This zinc cover, introduced by H. Taylor, Esq., for his cottage hive, will also be found useful as a protection from wet, for many other descriptions of round straw hives.

BELL GLASSES.

123

BELL GLASSES.



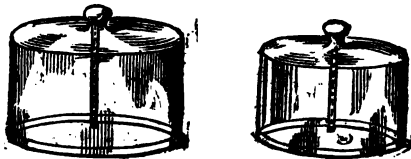
To contain 10 lbs., 10 inches high, 7 inches wide.

To contain 6 lbs., 7 inches high, 5½ inches wide.

To contain 3 lbs., 5 inches high, 4 inches wide.

These bell glasses are used in the hives before described. The largest is for Nutt's hive; the middle-sized is for our improved cottage hive; the smallest glass is so very small that it is not often used, and we do not recommend it. Bees will generally fill a middle-sized glass quite as soon as one so small as this.

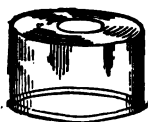
TAYLOR'S BELL GLASSES.



These glasses have been introduced by Mr. Taylor.

and are recommended as preferable to deep narrow glasses. The drawings will show that they are straight at the sides, flat at the top inside, with a knob outside to take hold by, through which is a half-inch opening to admit a ventilating tube. The larger is six inches deep, twelve inches wide; smaller, five inches deep, nine and a half inches wide.

The late Mr. J. H. Payne, of Bury, author of the "Bee-keeper's Guide" introduced another glass. It has



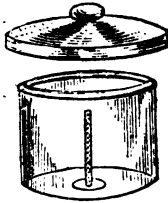
a three-inch hole in the centre, the purpose of which is to tempt bees to produce additional and larger stores of honey. It is to be used as follows:—

When a bell glass is half or quite filled, raise it, and place Payne's glass over the hole of the stock-hive, with the filled glass on it, over the three-inch hole. The bees will bring their combs through, and thus Mr. Payne found that they would store more honey than if the bell glass were removed and another empty one put in its place. Of course, the first glass must be smaller in diameter than Payne's glass, so as to rest upon it.

FLAT-TOPPED GLASS.

This is a glass super, to be placed on the hive in a similar way to the bell glasses already alluded to. It has the advantages of being straight at the sides, flat

at top, and without a knob; so that when filled it may be brought on to the breakfast table, inverted, on a plate. The glass lid shown in the engraving forms a cover, and fits over outside, so as not to interfere with the combs within. These flat-top glasses, like those with a knob, have a hole through which a zinc ventilating tube is inserted. Dimensions, six and three-quarter inches wide, five inches high.



GUIDE-COMB FOR GLASSES.

In some of our previous allusions to the best mode of inducing bees to commence working in glasses, we have recommended attaching guide-comb. We will now more particularly explain how this attraction can be best applied. We have already shown how bees may be induced to make use of guide-combs fixed to bars, and the same principle is applicable to glasses. These may be filled, with great regularity, by adopting the following directions, which, we believe, have never before appeared in print:—

Procure a piece of clean new empty worker honeycomb, which has not had honey in it (because honey will prevent adhesion to the glass); cut it into pieces of about three-quarters of an inch square. Gently warm the exterior of the glass (this we find is best done by hold-

ing the glass horizontally for a short time over the flame of a candle); then apply one of the pieces of empty comb inside at the part warmed, taking care, in fixing it, that the pitch or inclination of the cells is upwards—in fact, place the guide-comb in the same relative position that it occupied in the hive or glass from which it was taken. There is some danger of making the glass too warm, which will cause the comb to melt and the wax to run down the side, leaving an unsightly appearance on the glass; this should be carefully avoided, and a little experience will soon enable the operator to determine the degree of warmth sufficient to make the comb adhere without any of it being melted. It is hardly necessary to state that only the very whitest combs ought to be used. A short time should be allowed before changing the position of the glass, so that it may cool sufficiently to hold the comb in its place. Six or eight pieces may thus be fixed, so that, when the glass is filled,



it will present a star shape, all the combs radiating from the centre. The annexed engraving shows the appearance of a glass as worked by the bees, in which guide-combs were fixed in the manner described above. The drawing was taken from a glass of our own filled after being thus furnished.

In the Old Museum at the Royal Gardens, Kew, may be seen a Taylor's glass, presented by us, some of the combs in which are elongated on the outside to

the breadth of six inches. We believe, that not only does a glass present a much handsomer appearance when thus worked—and will, on that account, most fully reward the trouble of fixing guide-comb—but that more honey is stored in the same space, and in less time than if the glass be placed on the hive merely in a naked condition for the bees to follow their own devices.

This mode of fixing guide-comb does not solely apply to the above-shaped glass, but is equally useful for all kinds of glasses. It is introduced in connection with this glass because, from its having a flat top and no knob, the regularity is more clearly apparent.

The working of bees in the bell glasses illustrates how tractable their disposition really is, if only scope be allowed for the due exercise of their natural instinct. They have no secrets in their economy, and they do not shrink from our constant observation as they daily pursue their simple policy of continuous thrift and persevering accumulation. Yet it is only owing to the labours of successive inventors that we are now enabled to watch “the very pulse of the machine” of the bee-commonwealth:—

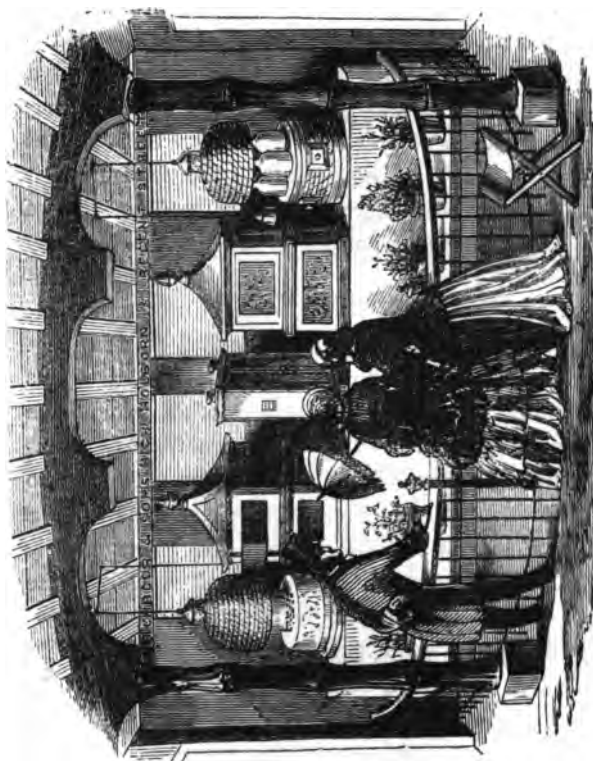
“ Long from the eye of man and face of day,
Involved in darkness all their customs lay,
Until a sage well versed in Nature's lore,
A genius formed all science to explore;
Hives well contrived, in crystal frames disposed,
And there the busy citizens disclosed.”

MURPHY'S *Vaniere*.



EXTERIOR OF AN APIARY.

As originally erected in the Zoological Gardens, Regent's Park.



INTERIOR OF THE ABOVE.

May be taken as suggestive for the construction or appropriation of rooms for larger Apiaries in summer-houses or other out-buildings.

THE NEW BOTTLE-FEEDER.

It has long been acknowledged that the best mode of feeding bees is through an opening at the top of the stock-hive. The new bottle-feeder is a simple and good means of administering food when a stock requires help in that way, as bees can take the food from it without leaving the hive. Any kind of hive that has an opening at the top may thus be fed. Another important feature is the cleanliness with which liberal feeding can be accomplished; and few operations require more care than does feeding. If liquid sweet is left hanging about the hive, it tempts robber-bees; and when once the bees of an apiary have had a taste, there is no knowing where their depredations will stop: they resolutely attack and endeavour to rob other hives, fighting and killing one another to a considerable extent. Even if no hives be completely destroyed, weakness from loss of numbers will be the portion of most, if not of all, the hives in the garden.



The morals of our favourites are here a good deal at fault, for the stronger hives, when their inordinate passion is thus stirred up by the carelessness or want of knowledge of the bee-keeper, attack and prey upon the weaker ones. To be "forewarned is to be forearmed"—and "prevention is better than cure." We strongly recommend closely covering up the feeder; one of the middle-size

bell glasses put over it makes a close-fitting cover, should the regular cover to the hive not be sufficiently tight. When bees are not kept in a bee-house, and are, on that account, more accessible, this extra care is particularly needed. The right time for feeding is in the autumn or spring. As stated at page 76, it is requisite to ascertain the condition of the hive at Michaelmas, and, if wanting, the deficiency can then be made up.* It is not wise to defer feeding until later in the season, because it is important that, when the food is placed in the cells, the bees should seal it up; and a tolerably warm temperature is required to enable them to secrete the wax for the delicately-formed lids of the cells. If the food remained unsealed, there is danger of its turning sour, and thereby causing disease among the bees. It is not well to feed in mid-winter or when the weather is very cold: bees at such times consume but little food, being in a state of torpor, from which it is better not to arouse them.

A little food in the spring stimulates the queen to lay more abundantly, for bees are provident and do not rear the young so rapidly when the supplies are short. In this particular, the intelligence of bees is very striking; they have needed no Malthus to teach them that the means of subsistence must regulate the increase of a prosperous population:—

* A much greater quantity of food will have to be administered than the actual weight required to be furnished, because there is a very considerable decrease after it is taken by the bees.

“The prescient female rears the tender brood
In strict proportion to the hoarded food.”

EVANS.

Judgment has, however, to be exercised by the apiarian in giving food, for it is quite possible to do *mischief by over-feeding*. The bees, when over-fed, will fill so many of the combs with honey, that the queen, in the early spring, cannot find empty cells in which to deposit her eggs, and, by this means, the progress of the hive is much retarded,—a result that should be guarded against.

The following directions will show how the bottle-feeder is to be used:—Fill the bottle with liquid food; apply the net, affixed by an india-rubber band, over the mouth; place the block over the hole of the stock-hive, invert the bottle, the neck resting within the hole in the block; the bees will put their tongues through the perforations and imbibe the food, thus causing the bottle to act on the principle of a fountain. The bottle being glass, it is easy to see when the food is consumed. The piece of perforated zinc is for the purpose of preventing the bees from clinging to the net, or escaping from the hive when the bottle is taken away for the purpose of refilling. A very good syrup for bees may be made by boiling 6 lbs. of honey with 2 lbs. of water, for a few minutes; or loaf sugar, in the proportion of 3 lbs. to 2 lbs. of water, answers very well when honey is not to be obtained.

ROUND BEE-FEEDER.

Round bee-feeders are made of zinc and earthenware, eight inches across, three inches deep. The projection outside is a receptacle for pouring in the food; the bees gain access to the feeder through a round hole, which is placed either



at the centre or nearer one side, whichever may best suit the openings on the top of the stock-hive. The feeder occupies a similar position to that of the glasses or cap hives in the gathering season. A circular piece of glass, cut so as to fit into a groove, prevents the bees escaping, and retains the warmth within the hive, whilst it affords opportunity for inspecting the bees when feeding.

The feeders were originally only made of zinc; but some bee-keepers advised the use of earthenware, and a few have been made to meet the wishes of those who give the preference to that material.

When the bees are fed from above in this manner, the feeder is kept at a warm temperature by the heat of the hive. In common hives, cottagers feed the bees by pushing under the hive thin slips of wood scooped out, into which the food is poured. This plan of feeding can only be had recourse to at night, and the pieces of wood must be removed in the morning. By feeding at the top of the stock-hive any interruption of the bees is

avoided. For further instructions on this head, see the directions given for using the bottle-feeder.

ZINC FOUNTAIN BEE-FEEDER.

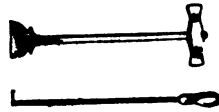
We have invented the fountain bee-keeper, in order that a larger supply of liquid food might be given to a hive than is practicable with the round feeder.



The liquid honey is poured in at the opening, which unscrews; whilst being filled, the inside slide, closing the opening through which the food passes into the feeding-pan, should be shut down. When the reservoir is filled, the screw is made fast, and, the slide being withdrawn, a wooden float, pierced with small holes, through which the bees take the food, forms a false bottom, and rises and falls with the liquid. This feeder, being on the siphon principle, like a poultry or bird water-fountain, is supplied from the reservoir until that is empty. A piece of glass is fixed in the side of the reservoir, in order that the bee-keeper may see when it is emptied. A flat piece of glass on the top prevents the bees from escaping, and through it they may be inspected whilst feeding. The bees find access to the feeder on to the perforated float through the central round hole, which is placed over a corresponding hole in the stock-hive.

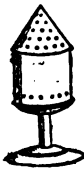
HONEY CUTTERS.

Honey cutters are used for removing comb from boxes and glasses without damaging it. The flat-bladed knife is for disconnecting the combs from the sides; the hook-shaped one is for the same purpose, to be applied to the top or horizontal part of the box or glass.



BOX FUMIGATOR.

This fumigator is a tin box, somewhat like a pepper-box upon a foot. It is a simple adaptation of the fumigating apparatus described by Mr. Nutt, and is used in the following manner:—Have a straw hive or other vessel ready that will match in circumference the hive intended to be fumigated. If the empty hive have a conical top, it will not remain crown downwards without a rest; in this case, it will be convenient to invert it on a pail. Having ascertained that the hive to be operated upon and the empty one in its reversed position nearly match in size, take half a packet of the prepared fungus, fire it well, and place it in the box or fumigator; place this in the centre of the empty hive, then bring the occupied hive directly over, so as to receive the fumes of smoke. To keep all close, put a



wet cloth round the place where the two hives meet. In a minute or two, the bees may be heard dropping heavily into the lower empty hive, where they lie stupefied. After a little while, the old hive may be tapped upon to make the bees fall more quickly. On removing the upper hive, the bees from it will be found lying quiet at the bottom of the lower one. Place a sheet on the ground, and spread the bees on it; then, with a feather, sort them over, in order to pick out the queen-bee. As soon as the queen is found, pour the rest of the lethargic swarm from off the sheet back into the inverted hive again. The stupefied bees must now be sprinkled freely with a syrup made of honey and water, or sugar and ale boiled together. Some apiarians recommend a few drops of peppermint to be mixed with the syrup, in order to drown the peculiar odour which is special to each hive of bees,—this is more necessary when two hives of bees are fumigated, and whilst under the influence of smoke are well mixed together. The hive containing the bees with which it is intended to unite the stupefied bees must now be placed on the top of that containing the latter, just as the hive was from which they have come. A wet cloth must be fastened round the two hives, so as to prevent any of the bees from escaping. The hives in this position must be placed where they are not likely to be knocked down or meddled with. The fresh bees in the upper hive, attracted by the scent of the bees besmeared with honey,

TUBE FUMIGATOR.

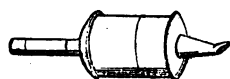
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go down and commence licking off the sweets from the sleepy ones. The latter gradually revive, when all get mingled together and ascend in company to the upper hive, where they live as if they had not been separate families. The two hives should be left undisturbed for twenty-four hours, then the upper hive may be removed and placed immediately on the spot from whence it was brought.

The reason the queen is recommended to be taken is to prevent any fighting. She should be kept alive and fed as long as she will live, in case any harm should befall the sovereign of the other community.

TUBE FUMIGATOR.

The tube fumigator* is useful for several purposes. When a frame-hive has to be disturbed it is requisite to raise the lid and blow a little smoke into the hive, so as to check the angry passions of the bees. If it be desirable to stupefy the bees, ignited fungus must be placed in the box and the flattened end applied to the entrance of the hive; the smoke is then blown in, either with bellows or by applying the mouth of the operator, taking care to close all openings through which it can escape. The bees fall down stupefied,



* This fumigator will be found to possess many advantages over the box fumigator before mentioned.

generally in about ten minutes; but the effect varies according to the populousness of the hive and the quantity of comb in it. The projected operations must now be performed speedily, as activity will soon be regained. See preceding directions.

THE BEE DRESS OR PROTECTOR.

All operations connected with the removal or the hiving of bees should be conducted with calmness



and circumspection. Bees, although the busiest of creatures, entertain a great dislike to fussiness in their masters, and become irritable at once if the apiarian allows them to see that he is in a hurry. Hence, there is great advantage in having the face and hands covered whilst at work amongst the bees; for when the operator knows he cannot possibly be stung, he

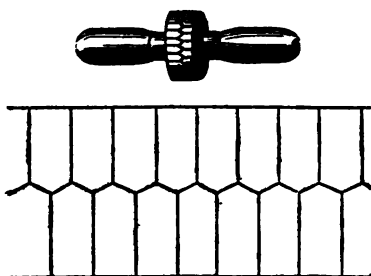
can open his hives, take out the combs, gather in his swarms, or take the honey, with all the deliberation of a philosopher. Various kinds of bee-dresses have been contrived; one that we keep ready in stock is of a very simple construction. It is made of strong *black net*, in shape like an inverted bag, large enough to allow of a gentleman's wide-awake or a lady's hat being worn underneath. The projection of the hat or cap causes the dress to stand off from the face, and the meshes of the net, though much too small for a bee to penetrate,

are wide enough to allow of clear vision for the operator. An elastic band secures the dress round the waist ; the sleeves also, made of durable black calico, are secured at the wrists by a similar method. The hands of the bee-master may be effectually protected with a pair of india-rubber gloves, which should be put on before the dress is fastened round the wrists. This kind of glove is regularly used by photographers, and allows of greater ease in manipulation than any other description.

Thus a very simple and inexpensive means of protection will enable even a novice in bee-keeping to make his observations and conduct his experiments under a sense of perfect security. Still, he need not be careless as to the feelings of his bees ; his success and their comfort will be promoted by his "handling them gently, and as if he loved them." "Familiarity" between bees and their master "breeds" not "contempt," but affection.

Any sudden or clumsy movement, which jars the combs or frames, will excite the bees, and if but one should be crushed, the odour of their slaughtered comrade rouses the inhabitants of the hive to a pitch of exasperation. Their powers of smelling are very acute. The human breath is abomination to them ; therefore, when operating upon bees, be careful to close the mouth and breathe only through the nostrils. The best time for most operations is in the middle of a fine day.

**ENGRAVED PRESSING ROLLER FOR THE
GUIDANCE OF BEES IN THE CONSTRUCTION
OF HONEY-COMB ON THE BARS.**



This is an engraved metal roller, which, when applied to the coated underside of a comb-bar, leaves an impression as shown in the diagram. The wax having been spread on the flat bar, the roller, heated by being put into hot water, is heavily pressed over it. The roller has two wooden handles, so that considerable pressure may be given to it. The roller is a little less than two inches in diameter, seven-eighths of an inch wide, and the length from handle to handle is six inches. The diagram shows the full size of the impressions as left on the wax, after passing the roller along the comb-bar, in the manner above described. It is a contrivance invented in Switzerland, and exhibited in the International Exhibition of 1862, when the pattern roller was purchased by ourselves.

The bars of a hive prepared with these markings in wax afford ready-made foundations for regular combs, which very much facilitate the operations of the bees.

IMPRESSED WAX SHEETS FOR ARTIFICIAL COMBS.

These artificial partition walls for combs are sheets of genuine wax, about the substance of thin cardboard. They receive rhomboidal impressions by being pressed between two metal plates, carefully and mathematically prepared and cast so that the impressions are exactly the same size as the base of the cells of a honey-comb. An inspection of a piece of comb will show that the division of the opposite cells is made by a thin partition wall, common to both. Now the substance of this is said to be only the one hundred and eightieth part of an inch, whilst the artificial ones we are recommending are between the thirtieth and fortieth part of an inch, more than four times the thickness of the handiwork of the bees themselves. It would, indeed, be vain to attempt to furnish sheets of wax at all approaching their own delicate fabric; the impressed sheets are quite as thin as they can be to bear the handling which is requisite for fixing them in the hives. We find, however, that the thickness is no disadvantage; the bees speedily excavate and *pare the artificial sheet* so as to suit their own notions of the substance required; then, with admirable

economy, they use the surplus thus obtained for the construction of the cells. After a sheet has been partly worked at by the bees, it is interesting to hold it up to the light and observe the beautiful transparency of that part of it, contrasted with the opaqueness of the part not yet laboured upon.

When it is considered, as writers tell us, that more than 14 lbs. of honey are required for the secretion and elaboration of a single pound of comb, it will not be difficult to form a just estimate of the value of this invention, which thus furnishes cheap and excellent assistance to our industrious favourites. It also shows the bee-keeper that all clean empty combs should be carefully preserved and considered as valuable stock. Another great advantage that it affords us is, that it renders us independent of *guide-comb*, which is not always obtainable. When a sheet or a strip of this impressed wax is properly fixed to the comb-bar, it is *certain* to be the guide and foundation of a straight comb. This invention has been derived from Germany, where it has been adopted many years with success. At the International Exhibition of 1862, we purchased the metal plates or castings, so as to manufacture the impressed sheets with which we are now able to supply our customers; and, after the careful trials we have made, we have great confidence in recommending them.

In the season of 1863 we furnished a Woodbury glass, super, with the wax sheets fixed to the bars, in the

manner hereafter to be explained, and it was truly astonishing to see the rapidity with which these sheets of wax were worked into comb. Receptacles were quickly made ready for the storing of honey, and the new combs soon became beautifully white ; for, although the artificial wax has a yellow tinge, yet, after being worked at and made thinner, it is as good in colour as ordinary combs. For supers we cut the wax plates in half, making one serve for two bars.

We have received from Germany the following directions for the fastening of the artificial plates to the comb-bars. Hereafter will be described a plan which we have adopted, and to which preference is given.

(*Translation.*)—"The unstamped edge of the plate receives incisions half an inch distant from one another, made with a sharp knife, the plate having been a little warmed ; then it is pinched between two equally strong ledges, which have been well moistened. The projecting edge of the plate which received the incisions is alternately bent to the right and to the left. The comb-bar is well besmeared with artificial sticking wax (a mixture of two parts of wax and one part of American resin), and is well warmed at a fire. Afterwards the besmeared side is laid upon the bent end of the plate, and pressed to it as firmly as possible. A small wooden ledge, besmeared with sticking wax, and fastened by means of pressure to the lower edge of the plate, prevents it from bending, which sometimes happens when the bees work it."

To carry out the directions here given, it is necessary to warm the besmeared comb-bar at a fire ; the wax plate has also to be warmed. Having tried this plan, and found inconvenience attending it, especially from the wax curling with the heat and the difficulty of making it stick firm, to say nothing of the uncomfortableness of performing the operation before a fire on a hot day in July, we began to consider if a little carpentering might not do the work better and more pleasantly, and adopted the following plan :—We split or cut the comb-bars of the Woodbury super in half, lengthways, and, taking the unstamped edge between the two strips, joined them together again by small screws at the side, confining the wax plate tightly in the centre, with no possibility of its falling down. Where frames are used, of course the bar could not be cut in two (except with the “compound bar and frame,” where the bar being loose, it might be as easily managed). The plan we adopt with an ordinary frame is to saw out an opening, about an inch or an inch and a half from either end, where the sides are morticed in ; this opening we make with a keyhole-saw. Through it the wax plate is easily put, and, with a heated iron passed over the upper side of the bar, is made sufficiently firm. If the wax plates are too large, a portion may be cut off ; an opening of full eleven inches long can be made without materially weakening the bar and frame.

Another, and perhaps the simplest, plan is, to fix a strip of wood with brads to the underside of the top

frame or bar ; place the wax sheet against this, then wedge another strip close to it, and thus hold the wax sheet firmly in the centre of the frame, taking care also to make the second strip of wood fast with brads.

The wax plates must not extend to the bottom of the frame ; a space of at least one inch should be left for expansion, because the bees, in working the plate, stretch it down lower. We also use a few pins firmly pressed into the frames, and long enough to reach the edge of the plate ; for by fixing three or four pins on either side, both at the sides and at the bottom, the plate may be held in an exactly central position within the frame. As before mentioned, when these directions are carried out, there is no fear of being troubled with crooked combs or bars.

The secretion of wax, and the method of its adaptation by the bees, is thus admirably described by Evans :—

“ Thus filtered through your flutterer's folded mail
Clings the cooled wax, and hardens to a scale.
Swift at the well-known call, the ready train
(For not a buzz boon Nature breathes in vain)
Spring to each falling flake, and bear along
Their glossy burdens to the builder throng.
These, with sharp sickle, or with sharper tooth,
Pare each excrescence and each angle smooth,
Till now, in finish'd pride, two radiant rows
Of snow-white cells *one mutual base* disclose ;
Six shining panels gird each polish'd round,
The door's fine rim, with waxen fillet bound,

*While walls so thin, with sister walls combined,
Weak in themselves, a sure dependance find.*

* * * * *
Others in firm phalanx ply their twinkling feet,
Stretch out the ductile mass, and form the street,
With many a cross-way, path, and postern gate,
That shorten to their range the spreading state."





MANIPULATION AND USES OF BAR AND FRAME HIVES.

HAVING, at page 84, given a description of the mechanical arrangements of bar and frame hives, the next thing is, to describe the mode of introducing the bees, and of thus bringing the humane and scientific hives into operation. The swarm should be first hived into a common straw hive from the bough or shrub upon which they may have alighted; place this hive, into which we will suppose the bees have been shaken, on the ground, propped up on one side with a brick or a flower-pot, or anything of the sort that may be handy, in order that straggler-bees may join the swarm. The spot selected for this should be as shady an one as can be found, near to the place where the swarm settled; or it may be shaded from the rays of the sun by fixing matting on two poles, so as to prevent the heat falling on the hive; spread a sheet or cloth on the ground where an even

surface can be obtained; stake this sheet down at the four corners, to prevent ruts and inequalities, which are great hindrances to the bees going into the bar and frame hive; place the latter upon the sheet, without its floor-board, having its front raised on blocks or sticks rather more than an inch,—not more, otherwise the bees will cluster, and attach themselves to the lower part of the frames, instead of going up between. These preparations will, perhaps, occupy ten minutes, by which time the swarm will have become settled and tolerably quiet. Then, with a sharp rap, precipitate the bees out of the straw hive on to the sheet immediately in front of the frame hive; give the straw hive another knock, so as to dislodge all the bees, and then take it quite away, otherwise they may, if it be left near, perversely choose to go into that, instead of the one desired. In some cases, as when the swarm has to be brought from a distance and procured from a cottager about whose skill in carrying out these directions there may be misgivings, it is best to give instructions that the swarm be brought home after sunset, and then the foregoing directions for inducing the bees to tenant the frame hive may be better carried out. For ourselves, we much prefer the evening for the purpose. A little water sprinkled over them from a watering-pot is likely to induce the bees to quit the ground and go up into the hive more quickly.

Mr. Langstroth, in his admirable book, "The Hive and Honey Bee," writes:—"If they are too dilatory in

entering the new hive, they may be gently separated with a spoon or leafy twig where they gather in bunches on the sheet, or they may be carefully 'spooned up' and shaken out close to the front of the hive. As these go in with fanning wings, they will raise a peculiar note, which communicates to their companions that they have found a home, and in a short time the whole swarm will enter, without injury to a single bee." In the *Journal of Horticulture*, Mr. Woodbury says:—"If combs be fixed in the frames, the crown-board may be removed and the cluster knocked out of the straw hive on to the top of the exposed frames. The bees will disappear between them with the utmost alacrity, delighted to have met with a ready-furnished dwelling, and the top, or crown-board, having been replaced, the hive should at once be removed to the position it is intended to permanently occupy."

No one should attempt these operations without being protected by a bee dress and a pair of india-rubber gloves, which are sting-proof. Some persons also take the precaution of tying strings round the ankles of the trousers, lest some straggler should determine to attack the outposts of the enemy, which, to say the least, might perplex the operator in the midst of his task. Elastic india-rubber bands are good for this purpose, or a pair of "knickerbockers" would be useful. If Wellington boots are worn, the trousers may be tucked within the leather, in which case no bee can molest the operator,

and no string or band will be needed. Practice makes perfect in bee-tending, as in other matters, and when a light hand is gained, there is little danger of the apiarian being stung.

If the weather be wet the next day or so after hiving, it will be well to give a little assistance to the new colony in the shape of food, for although, when a swarm leaves a hive, almost every bee composing it fills itself with honey, we have known not a few instances, in case of very wet weather, in which the whole swarm has been starved for the want of this little timely help. Of course, the first work of the bees is to build themselves combs, and these combs being produced by the secretion of wax from honey, a great drain upon their resources immediately begins, and any little outlay at this juncture is abundantly compensated by its enabling these industrious emigrants the more quickly to push forward the furnishing of their new home.

Clean combs from hives that may have lost their bees are readily accepted, and cause a great saving in time and material to the bees; these combs may easily be fixed by cutting them the proper size to fit within the frames, and making them firm by tying with tape or fixing them with pliable wire. In any case where the combs are too small to fit within the frame, a temporary bar may be fixed, and held firm by being sprung within the two upright sides of a frame, and thus pushed up until it presses the comb; then a piece of tape wound

round, or a clip made of tin or zinc shaped to the top bar, prevents its falling out. All these supports may be removed* as soon as the bees have made the foundation secure; the comb will then be added to. In this way, every loose piece of comb may be economised.†

These preparations must be made prior to the bees being hived, so that when a hive is so prepared, a swarm may begin to adapt whatever advantages they find ready for them; and it is truly marvellous what a swarm will do when thus furnished with combs in their new habitation. In these the queen can immediately begin to deposit her eggs, and the workers to store their honey, without having to wait for the construction of combs, which is a laborious occupation for the bees.

In some cases, fine white combs of honey may be taken from the stock-hive; the end frames are always the most free from brood. Care must be exercised not to rob this part of the hive too much; one comb may, perhaps, be removed in the course of the season without impoverishing the bees, but it is not wise to take more.

* They should be first dismembered from the comb by running a penknife between.

† Artificial comb may be advantageously used, especially if a little time (say a couple of days) be allowed to elapse before it is put into the hive; because, at first, so eager is a swarm to push forward the work of comb-building, that the sheets are liable to become mutilated. For guide-comb, cut the sheets in strips of rather more than an inch in depth, and fix them as mentioned at

PUTTING ON SUPER HIVE.

A colony established a year or more is called a "stock," by way of distinction from a swarm of the present year. Supposing the hive to be a stock, the super should be given them at the early part of the season, say, if fine and warm, at the latter end of April or beginning of May; if the weather be then unfavourable, it is better to delay doing so until a more genial temperature. If the colony be a swarm of the present year, two weeks should be allowed to elapse from the time of tenanting a hive, before putting on the super; this delay is necessary to give the bees the opportunity of building combs in their new domicile, and of getting a store of honey for themselves before working for their master.

When it is wished to use a super, *the crown-board or roof of the stock-hive must be taken away, the thin adapting or honey-board taking its place.* The two long slits at the sides are to give admission to the super. The bees will begin sooner, and work faster, if the eight bars are each furnished with artificial comb (as described at page 152). We have had depriving-hives very quickly filled when the bees were thus assisted. Combs that have been left unfilled may be fixed to the bars as before described; these must be white and clean, as dark comb should not be used for super hives. The combs, when filled, may be taken out singly, if desired for consump-

tion, substituting an empty bar or comb ; or, should the bee-keeper desire to see a handsome super, he must wait until the bees have filled and sealed up all the combs, and then he may proceed to disconnect the super by drawing a string or wire *between the adapting-board and the stock-hive*. After waiting a short time for the commotion to subside, the operator must raise the super on its board and blow in a little smoke. The bees may be induced to quit by adopting either of the means described at pages 58 and 73. When the super has been removed, another may be put on ; but if the honey-gathering be over, the crown-board should be replaced.

TAKING OUT FRAMES WITH COMBS.

It is well for a beginner to practise the directions for opening and shutting up hives, by using an empty hive until he becomes familiar with the handling of the frames.

The first thing to do is, to loosen the crown-board, or lid, with a knife, drawing a piece of string underneath it, to divide the wax or cement with which the bees make all secure. This string should be drawn through very slowly, so as not to irritate the bees. In hot weather, the crown-board may be loosened by a lateral movement ; but sometimes, for want of care, this loosening of the lid disturbs the bees, and, as soon as it is removed, a number of them, enraged thereby, rush out and attack the operator. This and all other ope-

rations ought to be performed very carefully and gently. Especial care should be taken not to prise the lid upwards, by way of wrenching it off, for the frames and combs are generally secured thereto, and there is a liability of rending the combs with it; this will greatly irritate the bees, and be otherwise injurious. When a hive of bees is enraged, there is little chance of pacifying them; it is best, under such circumstances, to "give in," at once, and not attempt to perform any operation, but to shut the hive up and beat a retreat, benefiting by the experience, in order to do better a day or so afterwards. There are various devices for intimidating or conciliating the bees, and one of these already spoken of is—smoke. So next time the experimenter makes his attempt let him raise the lid an inch or so, and blow a few puffs of smoke into the hive, which will cause the bees to retreat. This is best done by using our tube fumigator, with a little of the prepared fungus lighted. Pipes or cigars are not convenient to use for this purpose when the head is enveloped in the dress. As soon as the lid is removed, a few bees will fly out to learn the cause of such an interference. Conciliation should then be offered by having at hand a little sweetened water, which may be sprinkled, or rather let drop, from a feather or a brush. The sudden motion of the hand required in the act of sprinkling irritates the bees, so that, instead of making them our friends, they may become our foes. Mr. Langstroth recommends that a

fine watering-pot, filled with sweetened water, be used for the purpose. Care must be taken not to drench the bees; only just sufficient should be given to run down the sides of the combs, as well as sprinkling the top. As soon as the bees really understand that syrup is being given them, they feast upon it, instead of angrily attacking the operator. Thus pacified, and with gentle treatment, but little difficulty will be found in proceeding with the work required. But the unskilled operator should on no account neglect to put on a bee-dress and gloves, as described above. We would err on the side of caution, although there is an old saying that "a cat in gloves catches no mice;" and the apiarian will find that his fingers are not so free to work as he would like, for gloves make them rather clumsy in drawing up the frames.

The frames must now be gently prised from front to rear; this may be done with a small screw-driver or other stout instrument with a wedged end to go into the notches. The frames fit loosely so as to allow of a little movement from back to front; a lateral or side-way movement might kill the queen, or, if not so fatal as that, might crush some of the bees and injure the brood combs, which must be carefully avoided. Of course, much depends upon the nature of the operation that has to be performed, whether or no all the frames should be thus loosened. If it be for making artificial swarms, or for any purpose requiring an interview with her majesty, the

whole of them must be loosened, because it often happens that all the combs have to be examined, sometimes twice over, before she can be discovered. Bees are very apt to build their combs in a slightly waving form, and in extracting one it will be needful to make room both for the comb and bees upon it to pass without scraping the next comb, and there will be a difficulty if the apiarian attempts to draw out one comb whilst the other frames are located in their appropriate notches. Let the operator gently proceed to lift, say, the third frame (allowing it to lodge on the little block that divides the notches) slightly nearer to the fourth frame, and the second nearer the third, so as to admit of sufficient space to lift out the end one. Very carefully and slowly he should lift the frame by taking hold, with thumb and finger, of the projecting shoulders that rest in the notch; and he must not let it touch or scrape the next frame or the sides of the hive, so as to crush or irritate any bees.

After the end comb is thus removed, it will be easy to extract the others, as there will now be plenty of room for drawing them out. A hive of exactly the same size should be at hand; and in case it be desired to remove the combs and bees into another hive, care should be taken that each comb occupies the same relative position that it did in the old hive.

In handling the frames, it should be borne in mind that they are to be held perpendicularly. To gain a view of both sides of the comb when searching for the queen,

or for any purpose requiring full inspection, with a little dexterity in twirling the frame round, the reverse side may be brought to face the operator, without letting the comb break away by its own weight, and so fall out of the frame, which it will do if allowed to deviate from its upright or downright position. If the operator could see an experienced person perform the operation, he would quickly understand how combs may thus be handled without any risk of a smash.

When placing frames in the hive, care must be taken not to crush a bee between the projecting shoulders of the frame and the rabbets or notches on which they rest, and on no account must the frame be let down with a jerk, or the bees will become exceedingly fierce: the frame should be so slowly deposited in its place that a bee on feeling the slightest pressure may have the opportunity of escaping unhurt thereby. The crown-board should be replaced by first resting its front edge in its place, and then slowly lowering the after part, looking carefully under, and momentarily raising it when necessary to avoid crushing a bee. Should the hive have its super on, the same directions may be followed. The super with its honey-board may be bodily taken away, and so placed and confined for a time that robber-bees cannot find an entrance, and also be far enough from the apiarian to be out of danger of being broken or overturned by him.

ADVANTAGES OF BAR AND FRAME HIVES.

It will be asked, Why all this trouble about bar and frames with straight combs built upon them? We have shown the full command which the bee-keeper has over a hive so constituted, and we now proceed to show how, in skilful hands, these advantages may be used successfully; though, in the hands of the unpractised and unskilful, the contrary may be the result.

All the bars and frames in an apiary ought to be of precisely the same dimensions, so as to fit every hive. This is essential for the strengthening of weak hives. A hive that is weakly may often be advantageously strengthened by having put into it a comb of brood from a populous stock, to which an empty frame from the weak one may be given; no bees must be on the brood-comb—these should be shaken off or gently dislodged with a feather into the hive from which the comb is taken. The frames of combs should then be, one by one, placed so as to fill in the vacancy, leaving the empty frame nearest the side. When a hive has been in use many years, the combs become very black, and every bee that is bred in a cell leaves a film behind. It may be understood how in this way the cells become contracted, and the bees that are bred in them correspondingly reduced in size. After the lapse of at least, say, five years, it may be necessary to begin removing the old combs. This may be done by cutting away the comb, or by sub-

stituting an empty frame for one with old black comb, gradually moving the frames towards each other. By taking two away in this manner in the spring or summer of every season, the combs in course of five years may all be reconstructed, and fresh clean ones be secured for breeding in, instead of the old black ones that otherwise would remain as long as the stock could live in the hive.

ARTIFICIAL SWARMING.

Every bee-keeper knows the anxiety he feels in watching and expecting a swarm to come forth, fearful lest his favourites should, "like riches, take wing and fly away,"—a mischance that it is desirable to prevent. In our description of natural swarming, this will be found fully treated of; we propose here merely to point out how, with the movable frames, this work of Nature may be assisted—we say assisted, because artificial swarming should, as nearly as possible, resemble natural swarming; that is, it should be performed at the same time of the year, and when the populous state of the hive makes a division desirable. This is easily known to be the case when bees hang out in clusters at the entrance, wasting their time in enforced idleness instead of being abroad gathering honey. It is also necessary that the hive contain drones.

When such is the state of the hive, the facility of

affording an artificial swarm with a movable frame-hive is a decided advantage. The best time for performing the operation is about ten o'clock in the morning of a fine summer's day. The following directions should be carried out :—Place ready a counter or bench that is firm and strong, and which has space on it for the inhabited—or, rather, the over-inhabited—frame hive and the empty one, which is about to be made the receptacle of a separate stock. The operator, attired in his bee-dress, and having the other appliances ready, may now open the hive* as before described, and proceed to take out the frames, carefully examining both sides of each comb to find the queen :† she is generally in the centre of the hive, so that it is not always needful to take out all the ten frames. As they are examined, the frames may be put into the empty hive, and when the object of the bee-master's search is found, he must carefully remove the frame containing her majesty, and may place it temporarily in the empty hive, at one end by itself. Next he must proceed to put the frames back

* Bees are apt to take the interference more kindly if the stock be moved a little distance from its accustomed stand ; in such case, place an empty hive in its place, to amuse returning bees. The can be shaken out when the hive it is desired they should inhabit is restored. If the hive be kept in a closed bee-house, the entrance should be shut down until the hive is replaced, when the clustered bees may be at once admitted.

† Italian queens are more easily detected, being of a brighter colour and, generally, larger than English queens.

into the old hive, closing up the vacancy caused by the removal of the comb with the queen on it, and leave the empty frame at the end. Then he may place the frame containing the queen, with the few bees that may be upon it, in the centre of the empty hive; and, finally, putting all the other frames in, and replacing the lid, the bee-master will place this hive in the exact position occupied by the old stock. The bees that are on the wing will go to the old spot, and, finding the queen there, they will rally round her, and very soon form a sufficient number to constitute a swarm; comb-building will at once begin, the frames will, in a week or so, be filled, and a satisfactory stock will thus be established. By doing this, at the right time, just before the bees are about to swarm, or when there are many drones, all the trouble of watching and waiting for them is saved. Mr. Woodbury claims the honour of having originated this mode of swarming.

This operation we performed, exactly as described above, with one of our improved cottage-hives, one afternoon at the latter end of May, 1862. Whilst inspecting our bees, we caught sight of the queen on the comb in one of the bell-glasses. This was a chance not to be missed, and we immediately resolved to form an artificial swarm, for the hive was very full of bees. Besides, being obliged to be away from the apiary most of the week, we were glad of the opportunity of so easily establishing a colony without the uncertainty and trouble of hiving a

natural swarm. In the first place, we slid a tin under the bell-glass, and removing the stock-hive from underneath, we took it a few feet away; then we placed an empty improved cottage-hive where the old stock had stood, and put the glass of comb containing the queen and a few bees over one of the holes in the crown of this new empty hive. The bees that were left abroad belonging to the old stock returned as usual to their old entrance as they supposed; soon a sufficient number formed a large cluster in the hive and began comb-building, the queen remaining in the glass until the cells below were sufficiently numerous for her to deposit her eggs in them. The division answered exceedingly well; both hives prospered: the old hive either had some princesses coming forward to supply the loss of the queen, or the bees used a power that they possess of raising a queen from worker-brood in the manner we have previously described.*

The foregoing account illustrates the successful formation of an artificial swarm; but, with a cottage-hive, gaining possession of the queen is quite a matter of chance. With a movable frame-hive she can at any suitable time be found.

Precisely the same plan is to be adopted with the old stock in the frame-hive as we have described in the case of the cottage-hive, that is, to remove it some few paces off: when the hives are in a bee-house, a similar result

* See Section 1, page 9.

may be obtained, by placing the new swarm for a day or two to the entrance used by the bees when with the old stock, and the old stock may be removed to an approximate entrance. Some apiarians recommend that a space be left between the two hives, by placing the hives on the right and left of the old entrance, in order that too large a proportion of bees should not enter the new hive at the old position, to the impoverishment of the other. But we have found the mode adopted with the cottage-hive answer so well, that we see no reason for recommending any different plan.

It is the office of the bee-master to assist, not in the least degree to oppose, nature. We know that when a natural swarm issues forth, it has its impregnated queen, and, when located in a new abode, it commences building worker-combs, leaving the building of the few drone-combs to a later period; but if a division of the hive should be made, by putting *half the combs* in one hive and half in another, the hive that is either queenless or contains an embryo queen will busy itself with building only drone-comb; thus a number of receptacles for useless bees is provided, which tends to weakness, and eventually to loss of the hive.

In the plan we have recommended for forming two separate families, we nearly follow the natural state of things; the comb that the queen is upon is the only one that is taken from the hive, and this vacancy should be filled in by moving the frames together, so as to leave

the empty frame at the end. The bees, under the government of the impregnated queen, construct the combs and furnish their new above, as before stated, with worker-cells.

By adopting the plan above described, the movable bar and frame-hive will prove far superior to any of the dividing hives, which provide for equal division of the combs.*

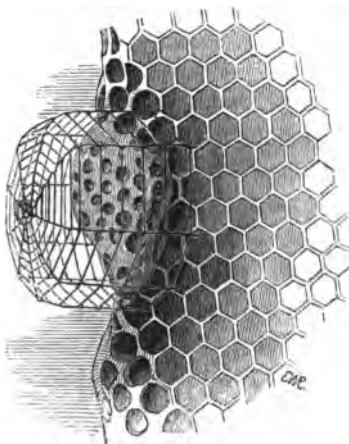
Perhaps the greatest advantage the movable frame-hive possesses is, that a full knowledge can be attained of its exact state as regards the queen, the population, and the quantity of food in stock. During weather of a genial temperature, the combs may on any fine day be inspected, and thus, a knowledge being gained of the deficiency existing in a hive, the necessary means may be adopted for supplying the want. Sometimes such an examination will verify the fears of the bee-keeper, when, having observed that his bees have ceased to carry in pollen, he has thereby received warning that the queen has been lost at some juncture when no successor to the throne could be provided. Such a hive has entered on a downward course, and will dwindle away entirely, unless a queen should be given to it, or else some combs containing young brood not more than three days old. By the latter method, the bee-

* At page 143 of Mr. Langstroth's "Honey Bee," other methods of artificial swarming are described, the perusal of which will well repay the scientific bee-keeper.

keeper will gain an opportunity of seeing the bees set about their wonderful process of raising a queen from the brood thus provided for them.

When a bee-keeper has become skilful in his calling, he may be desirous to encourage the breeding of queens, or rather of preventing their destruction. He will seek to use the propagating instincts of the worker-bees as a set-off against that innate hatred of rivalry which prompts the reigning queen to kill the tender royal brood.

An ingenious little contrivance has been brought into use by continental bee-keepers, especially by Herr Kleine,



a German pastor, to prevent the destruction alluded to. It consists of a small wire cage (in fact, a pipe cover), as represented in the above engraving, placed over a

queen-cell to protect it from the mother-bee's animosity, and it also serves to prevent the young queen, when hatched, from escaping; for she will have the same jealous feeling toward her sister-princesses, should there be more in the hive. The bee-master may thus carefully remove and appropriate her.

Particular attention will have to be exercised to affix the cage into the comb by pressure, as far as the middle wall, but at no point must it touch the royal cell itself. As the cage will probably project so as to touch the adjoining comb, a little incision and removal of a portion may be necessary, to allow space for it. It can, however, be squeezed into any shape to suit the position required.

This covering need ~~not be put~~ over the cell until the egg is a little more ~~than a week~~ old. The animosity of the reigning queen ~~does not~~ generally manifest itself until the royal brood ~~approaches~~ maturity.

It is said that ~~these cells~~ are unmolested on the tenth day, but that on the ~~eleventh~~ day they may be found tenantless. Notwithstanding ~~the~~ the apiarian's care and skill, many disappointments ~~are~~ frequently experienced in endeavouring to establishing fertile young queens at the head of colonies.

Hives found to be queenless may be supplied either with matured queens or with queen-cells. If the latter are sufficiently numerous, their introduction may easily be effected by exchanging a comb in each hive; if they

have to be cut out and place loosely in the new hive, a triangular piece of comb should then be removed with them, to be used as a block in preventing any pressure coming on them. A space must be cut out of the middle in the centre combs of the hive into which they are to be introduced. Special care must be taken not to bruise the royal embryos, as they are particularly sensitive to pressure. It is sometimes best to introduce royal brood into queenless hives in preference to matured *unimpregnated* queens, because, as mentioned at page 8, bees are reluctant to receive virgin queens, whilst they will tolerate one hatched in the hive, who will speedily depart to seek a drone. Bee-masters mostly use small hives for queen-rearing, consisting of, say, four combs. By extracting from a populous hive four such frames of combs (with the bees on them), and having eggs in the first stage (see page 9), or better still a royal embryo, the bees will rear a queen or queens therefrom. Care will have to be exercised to ensure that there is a sufficient number of bees to mature the brood brought from the hive.*

A colony of this character is technically called a "nucleus."

Such operations as queen-rearing should only be

* These weak little colonies should have small entrances, so as to be better able to defend themselves from the attacks of robber-bees, and they will require to be assisted and strengthened by feeding.

attempted in warm summer weather, and when drones are abundant.

A very great advantage that the Woodbury bar and frame hive affords, is the safety and convenience with which a stock of bees can in it be transported to any part of the kingdom: by a few additional arrangements, stocks have even been sent in it to distant countries. In many districts hives are removed to moors and heaths in autumn, for the purpose of gathering heather honey. In this operation, the frames are a great support to the combs, very much lessening the risk of a break down and consequent loss.

From a hive that has been inhabited all the winter, we have not unfrequently lifted out the frames and removed the stock to a clean hive; and we believe that the change has always been useful. The bees find a clean floor-board and a clean hive to breed in, free from insects that may have harboured in crevices about their former abode. When the change has been made, the old hive can be thoroughly cleaned and used in the same way for making the exchange with another stock. The process for handling will, of course, be the same as before described. We have found that, where this plan has been carried out, the bees seem to progress faster. Perhaps a little stirring up may be useful in arousing them from their winter doze. The time we recommend for doing this is in the beginning of April, but a fine warm day should be chosen.

DRIVING.

Driving is an operation by which bees are induced to vacate an old settled hive and to enter an empty one. Many apiarians prefer this mode of effecting an exchange of hives to the plan of fumigating the bees.

The greatest success attending such a transfer will be in the case of hives well filled with combs that are worked nearly to the floor-board; and it may be remarked, that bees are generally so far provident, that they leave an open space in which to pass underneath their combs over all the floor of the hive. When the old hive is inverted, the bees crawl up the combs, and thus more easily pass up into the new hive, which the operator places over the old one, with the intent that they should enter it.

The best time for performing this operation is about the middle of the day, and when the weather is warm. It is essential that the operator be protected with a bee-dress and gloves, as before described; and previous to commencing his task, he must provide all necessary implements. These are:—a couple of hives, one of which should correspond in shape and size with the hive from which the bees are to be driven; a cloth to tie round at the junction when the new hive is placed on the old one; some string to keep the cloth in its place; an empty pail to receive the top of the old hive, if one of the old conical shape, but if the stock of bees is in a

square box-hive with a flat top, a firm stool will be the best; and a tube fumigator with some fungus, which will complete the material of war. The bucket or stool must be placed securely on the ground, about a yard from the place where the full hive stands; then a few puffs of smoke, blown in amongst the bees, will cause them to retreat up amongst the combs. The bee-master must now turn the hive* upside down very gently, letting it rest in the pail or on the stool; he then quickly places the empty hive over the full one, and ties the cloth round it, to prevent any escape of the bees. If the cloth be damped, it will cling the closer to the hives. The third hive is intended to be placed on the stand formerly occupied by the stock, so as to retain the few returning bees which had been absent in the fields. Care must be taken that all crevices through which it is possible for the bees to escape from the united hives should be effectually closed. When the two are fairly united, the operator will proceed by rapping the full hive gently with the hands or a couple of sticks, more particularly on that side where the combs are the most thickly placed—that is, if the hive be not equally filled. A stock is in the best condition for driving twenty-one days, or thereabouts, after a first swarm has issued; the brood will then have hatched out, the bees will quit

* Care should be exercised in turning the hives over to keep the combs vertical, or they are likely to break from their foundations.

more readily, and there will be no loss of larvæ in the cells.

It generally happens that, in about fifteen minutes, the bees regularly commence the ascent; their exodus will be known by the distinct rushing sound which is always noticed when a colony of bees is on the move. The first thing bees do when disturbed is to fill their honey-bags, as they invariably do at swarming time; consequently, after the first rush into the new hive is over, as in the case of a swarm, the "flitting" bees are not much disposed to take wing. When the noise made by the ascending bees has been heard, and has in a great degree subsided, the cloth may be removed, and the old hive, now deserted, may be taken indoors; and if a few bees yet remain, they may be brushed off with a feather. An experienced apiarian, on first hearing the rushing noise before mentioned, will not hesitate to tilt the top hive over a little on one side, so that he may watch the bees during the ascent; the queen may be seen passing up, and if the operator desires to take her away, he can secure her by placing a wine-glass over her. This expedient is often resorted to in the autumn, when stocks are to be united, for in such a case the removal of the queen prevents some fighting.

If the taking of the honey be the object of the bee-master, then "driving" is manifestly a better plan than resorting to the fumes of sulphur for the purpose; for the bees from whom the store is taken can be joined to

stocks that are weak in numbers, with considerable advantage to the future prosperity of the apiary.

When the removed bees are to be joined to another stock, the operator will proceed as follows :—At dusk, dislodge the bees on to a cloth, sprinkle them with sweet syrup, and place the hive to which it is intended to join them over the mass; they will gradually ascend into the hive placed for them, and early next morning the hive, with its slender stock thus augmented, may be removed to its stand. Should the operator not have been successful, or not sufficiently skilful to gain possession of the queen, he may leave it to the bees themselves to decide which queen they will have.

By this plan of "driving," artificial swarms may be secured by an "expert" even in common hives, though those do not afford the facilities for such a purpose as do the bar or bar-and-frame hives.

CHANGING OLD STOCKS TO NEW HIVES.

We frequently find that the possessor of a stock of bees in a cottager's *common* straw hive is desirous of removing the whole stock of bees and comb into one of our improved hives, in which the honey may be obtained without the destruction of the bees. We mostly discourage such a transfer, attended as it is with much labour, and requiring a considerable amount of apiarian skill. An old-fashioned hive may very readily be rendered

a humane one, simply by cutting out with a sharp-pointed knife the middle of the top of the hive; a piece may thus easily be taken out, so as to leave a round hole two or three inches in diameter, but care must be taken that the knife does not penetrate much below the straw, lest it reach the comb or the bees—and it will be safer for the operator to have a bee-dress on. There should be ready a round adapting-board, with a corresponding hole, which may be secured on the top by putting four long nails through the same number of holes in the board; then a cap-hive or a glass may be placed on the top, for the purpose of admitting the bees, who will soon crowd therein to work.

This hive or glass will form a super or depriving-hive, and can be worked as profitably as most of the improved hives. For the sake of an improved appearance, an outside case, either of zinc, straw, or wood, may be dropped over all, and then, if well painted, the whole will form no disfigurement to any flower-garden.

This is, beyond doubt, the easiest way of overcoming the difficulty, but as it may not satisfy all, we now proceed to describe how a complete transfer may be made. No hive offers such facilities for the correct placing of the combs in a perfectly upright position as does the bar-and-frame hive. As before remarked, we should be slow to recommend any one to attempt the operation who is not already pretty well accustomed to the handling of bees and acquainted with their habits; but by care-

fully carrying out the following directions any one may successfully perform the feat. The first thing is to get the bees away from the combs: there are two ways of doing this,—one is by fumigation (see page 145), the other by driving (see page 179). Which-ever plan may be resorted to, have the bees confined in the old hive on their stand until you are quite ready to admit them into the bar-and-frame hive. Have in readiness all the necessary appliances. These consist of a large knife for cutting the hive, a good-sized table on which to lay the brood-combs, a basin of water—for washing off honey which may besmear the hands,—tape or cotton string to fasten the combs in their frames, a pair of honey-cutters for cutting out the combs, jars to hold the honey that runs out, and a feather for brushing off any bees that may remain. It is necessary that the operator should have on his bee-dress and india-rubber gloves. Then begin by slicing off a piece of the hive with a sharp table-knife; carefully cut out the working combs—cut them large, so that they will squeeze into the frames; and, to be more secure, wind some of the tape round to keep them in position until made fast by the bees. After a few days, these fastenings may be removed. Care should be taken that the combs occupy the same position in the frames as in the hive from which they were extracted. Having thus prepared the hive, the bees may be let into it, in the manner Mr. Woodbury recommends for a swarm (see page 159).

It may be as well to keep them confined a few hours, giving them water at the top, until they make the combs secure; the new hive will then be less likely to offer an attraction to bees from other hives, who, if feloniously inclined, might come to rob. This transfer should be made when the weather is such that the bees can fly about: when not warm enough, it should be done in a room at a temperature of about 70 degrees. An expert apiarian could perform the operation in less than three quarters of an hour, and with little loss. A week or so after a swarm has left the old stock is perhaps the very best time for such a removal. Should the operation be performed in the open air, the bees from surrounding hives will be sure to come in great numbers to obtain a share of the honey necessarily exposed, for they delight in plunder. In order, therefore, to avoid annoyance to the operator, and the excitement which is certain to be induced in surrounding hives, it is better to conduct the dissection in some building with closed doors. In some instances a routing of this kind has a beneficial effect; old stocks of hives that have previously appeared to be dwindling are often aroused to activity by their removal into a fresh domicile.

WEIGHING HIVES, &c.

One of the most effectual modes of ascertaining the condition of a hive is by weighing it. Such knowledge

is most important at the close of the gathering season, in order that the bee-keeper may determine whether he ought to give his bees artificial food to enable them to live through the dreary winter. A knowledge of the numerical strength of the colony is also useful, in enabling the bee-keeper to decide which hives will be benefited by being joined together, on the plan

explained in the articles on "Fumigation" and "Driving."

A hive can very easily be weighed, if a Salter's Spring Balance be suspended near the apiary. The hive, having a strap or cord passed under and over it, crossing at right angles on the top, may be hooked on to the balance, so that the weight will be indicated on the dial.



The annexed engraving represents a tripod stand, with a weighing-machine of the above-named construction, to which a hive with a super is attached.

Such an arrangement will be found convenient for

those bee-keepers who may not possess suitable sheds in their gardens, where a hive could be thus suspended from a beam.

This contrivance is both portable and simple, and can be used from time to time; or, if the apiarian desires to have the hive constantly suspended, a waterproof covering might easily be made to drop over, and adapted so as to admit of being raised occasionally for ascertaining the weight shown on the dial.

To prevent the hive being swayed to and fro by the wind, three cords (gear ropes) might be attached therefrom to the three legs of the stand. The height of such a stand need not exceed four feet.

Much interest might be derived by watching the daily or hourly increasing store brought into a hive during the gathering season.

Mr. George Fox, of Kingsbridge, and Mr. S. Bevan Fox, of Exeter, have for some years each kept one stock attached to a "Salter's Circular Spring Balance," suspended from a beam under a shed, and, from experience, find that from a hive so balanced a criterion may be formed of what other hives in the apiary are doing through the day.

Many ingenious contrivances will, no doubt, suggest themselves to the apiarian for suspending hives in this manner. For instance, instead of the cord being tied round the hive, three or four strong irons, with a screw at one end and a ring at the other (known by iron-

mongers as "eyes"), could be screwed into the floor-boards, to which the attachments might be made fast. It will scarcely be necessary to hint that great care is necessary that full provision should be made securely to support the increasing weight; a fall would be most ruinous, and terribly enrage the bees.

The weight of the hive should be marked on it when empty, so that the exact amount of its contents may at any time be ascertained. A colony of bees at Michaelmas ought to weigh from 20 to 24 lbs., that is, exclusive of the hive; if falling short of that weight, the hive should be made up to it by the artificial means before recommended.

Experienced apiarians are able to judge of the weight of a hive by lifting it a few inches from the stand; or by looking in at the windows of a stock-hive, a conclusive opinion may be formed as to the state of the colony. If the combs within view be well filled and sealed, it will be safe to consider that the hive contains sufficient stores to carry the bees through the winter.





VI. MISCELLANEOUS INFORMATION.

STINGS: THEIR PREVENTION AND CURE.

SOME of our readers may deem us neglectful in having, as it were, left them to struggle through their bee-keeping novitiate without informing them how to avoid being stung by their docile but well-armed flock. Of course, having described the bee-dress, we have supposed that the apiarian was clad, if not "in complete steel," at least in the head-gear and gloves, which will render him invulnerable. The best safeguard from the anger of bees—as, indeed, from the malice of men—is a quiet and peaceable spirit. The apiarian will learn to handle his bees not only as "if he loved them,"—as the quaint angler says—but as if he fully believes that the bees love *him*. This they will do whenever he approaches and treats them gently. There are some cases of exception to this generally peaceable disposition

of the bee; perchance a few bees are dyspeptic, and refuse to be pacified, let their master seek to bribe them never so wisely. Then, too, sometimes the bee-master himself may be dyspeptic, which the unerring olfactory sense of the bees speedily detects, and their anger is immediately aroused. Some few persons, owing to constitutional peculiarities in their breath or insensible perspiration, are objects of constant animosity with bees, who, by driving them from the apiary, are giving a physician's advice without charge for a fee. Some of the choicest perfumes used by ladies are offensive to bees; and one may feel very certain that the "fine puss gentleman," who disgusted the brave Hotspur with his "pouncet-box" and praise of "'parmaceti for an inward bruise," would have been speedily driven from an apiary in ignominious flight. Occasionally, even a skilful apiarian may inadvertently crush a single bee; such a mischance is detected by the community with much more facility than by any "crowner's quest," and their prompt verdict decrees the summary punishment of the offender. There would be much less fear of stings if it were always remembered that bees are never aggressive. "Defence, not defiance," is their motto. They scarcely ever attempt to sting when away from the hive, and very seldom indeed at the time of swarming, for then they are gorged with honey. When molested by angry bees, do not attempt to beat them off; the safest and best plan is to retreat to a green bush. Thrust your

head into this, or if no such refuge be near, in an emergency, throw yourself on the ground, and, with face downwards, the bees will soon leave you.

Yet some people appear to think they must inevitably be stung if they meddle with bees and for their sakes it is needful to explain why it is that a sting is painful, and how the wound inflicted by the bee may be cured. Those familiar with the usual microscopic objects will know how marvellously delicate, and yet effective, is the mechanical structure of a bee's sting. (See page 46.) This weapon, as we see it with our naked eye—finer than a needle's point—is only the sheath, which lengthens or contracts like the tubes of a telescope. The dart, as before said, is barbed on each side, so that the bee, when *very* angry, is scarcely ever able to withdraw it, but

“ Deems life itself to vengeance well resigned ;
Dies on the wound, and leaves the sting behind.”

There are, indeed, some happy mortals whose “blood such an even tenour keeps,” that a bee-sting is to them simply a puncture, and nothing more. Dr. Bevan has suggested that lovers should subject themselves to the ordeal of a bee-sting, in order to prove, we suppose, that their temper is proof against “the *stings* and arrows of any outrageous fortune” that matrimony can bring.

It is the homœopathically minute tincture of poison injected by the bee which causes inflammation. The

first thing to do is, to remove the sting, which, even when detached from the bee, will continue to penetrate still further into the wound. Next, press the hollow point of a watch-key exactly over the place stung; this will express a considerable portion of the virus. Then dip the hand, or bathe the part with cold or tepid water, for the poison is volatile, and will thereby be dissipated to a great extent. On no account whatever should the part affected be rubbed; to do that will diffuse the poison and increase the inflammation. The specific remedy for a bee-sting is taught us by chemistry: the venom is an acid which an alkali will immediately neutralize when brought into contact with it. Spirits of hartshorn will generally be found effectual for the purpose, and should always be kept in an apiary. There are also several other remedies more or less effectual, according to the special constitution of the patient. A strong infusion of tobacco-water applied to the wound after the sting has been extracted is a specific for many persons; others find relief from the application of a sliced onion.

We have heard the remark from several who have kept bees for years, that the poison from a sting has little or no effect on them; after receiving many inflictions, their flesh appears to become so little affected, that the swelling and pain at one time experienced no longer trouble them.

POLLEN, OR FOOD FOR INFANT-BEES.

Bees, when fully grown, feed almost wholly on honey; but the larvæ require for their development a more substantial kind of nourishment. Such solid fare is found by the bees in the *pollen* of flowers, a farina which contains some of those nitrogenous elements in which honey is deficient. The body of a worker-bee is covered with hairs, to which the pollen adheres when, by contact with the bee, it is rubbed from the anthers and stamens of flowers (see page 41). Dewy mornings or humid bowers suit the bees for the gathering of the pollen. If the atmosphere be too dry for kneading it into pellets, they roll themselves in the blossoms and trust to the good offices of the bees at home, who, on their return, brush off the farina into the cells intended for it. A portion of this "bee-bread" is taken at once by the "nursing bees," who are supposed to subject it to some change before offering it to the larvæ; but the greater part of the pollen is stored away and sealed over in the cells for future use. In April and May, the bees are frequently busy "all the day" in gathering pollen, and often one community of bees will collect about twenty pounds weight of "bee-bread" in one season.

One of the objects of the apiarian is to assist the bees in providing for the nurslings of the hive. A German pastor, Herr Dzierzon, first suggested the plan of providing the bees with "unbolted rye meal," as a substi-

tute for the farina of flowers. He had observed that, in early spring, before the flowers were open, his bees had entered a neighbouring corn mill, from whence they returned laden with rye flour. Since his discovery, some keepers, in early spring, place either rye or wheat meal near the apiaries ; to this artificial store the bees repair by thousands, and seem to rollick in the enjoyment of such plenty, many of them returning to the hive as dusty as millers. The object in thus supplying them is, that the brood may be rapidly brought forward, and early swarming induced. In this way, a few pounds of rye meal, at one penny per pound, may tend to the production of very many pounds of honey of twelve times the price,

In gathering pollen from flowers, bees are doing more than merely providing for their own community. Whilst humming through our gardens they are assisting to propagate our flowers, and their merry buzz in our orchards indicates that the blossoms of spring will in autumn fulfil their promise by abundance of fruit. In Mr. Darwin's remarkable work, "The Fertilization of Orchids," the mystery of the fructification of flowers is scientifically explained ; but before the subject was so fully understood, it was quite believed that bees, in passing from flower to flower, performed some important service. Owners of fruit-trees have noticed, in a season generally unfavourable for the orchard, that if during only one fine forenoon the bees had spread freely

amongst the blossoms of a particular tree, it would prove more fruitful than its fellows. On this account, the orchard is a good place for an apiary, for it seems that, more abundant the honey, more plentiful will be the fruit. Bees bear the fructifying matter from one *sex* of flowers to the other, but they confine their attention to one *kind* of flower during each excursion; and the careful observer may see how the colour of the pollen on the bodies of the bees will vary from yellow to red and brown, according to the kind of flowers from which it has been gathered. The gathering of pollen, its use by the nursing bees, and the storing of it in the cells, afford to the bee-keeper opportunity for observations of exceeding interest.

PROPOLIS, OR BEES' CEMENT.

The old notion that wax is gathered by bees from flowers, as they gather honey, has long since been set aside by the discoveries of Hornbostel and Huber. Wax is an oily substance, as described at page 45; but there is "a resinous substance, very tenacious and semi-transparent," which is indispensable for the bees as a cement wherewith to fix their combs and fortify their hives against intruders, and this is "propolis." The bees, in working the propolis, often soften it by blending it with a portion of wax; but they have to extract it in its natural state directly from the bark and buds of cer-

tain trees. The bark of the willow, the leaf-buds of the poplar and alder, and the unopened blossoms of the hollyhock are very usual sources of propolis. In the case of a new swarm, as bees must have this glue before they can begin to build their combs, they will resort to most unlikely places to obtain it. Sometimes they will enter a paint shop and attack the varnish, and it is said they have been seen to obtain propolis from the pitch and rigging of a ship. These circumstances afford intelligible hints to the apiarian, who, if his bees have not easy access to firs, poplars, or willows, will provide some glutinous or resinous matter which may serve for a substitute. The extraction of propolis costs the bees very considerable labour, which they should be relieved of as much as possible, in order to facilitate their great work of honey gathering. Bees choose the warmer part of the day during which to gather propolis, as then it does not so rapidly stiffen. Frequently, when they arrive at the hive, it has become so hard that the other bees are scarcely able to gnaw it from their thighs.

With propolis bees fasten down their hives, stop up crevices to exclude moths and ants, and sometimes use it to narrow the entrance of their hives against the invasion of wasps. Extraordinary anecdotes are told of the prompt and ingenious use they make of this substance. Reaumur relates, that a snail having been observed by the bees on the window of the hive, they proceeded to

glue the shell to the glass, and there sealed down the intruder in hopeless durance. In another case, that of a slug, or snail without a shell, the bees, having slain it with their stings, were quite unable to remove it from the hive. With wonderful foresight, they then proceeded to secure their community from the noxious effects likely to arise from the decay of the carcase; and this they did by completely enveloping it with a coating of impervious varnish. Huish relates a similar occurrence in the case of a mouse caught in a hive by bees. Propolis yields *benzoic* acid, and contains some aromatic properties.

PASTURAGE FOR BEES.

“ Bees work for man; and yet they never bruise
Their master's flower, but leave it, having done,
As fair as ever, and as fit for use.”

Apiarians generally agree in the opinion that very little can be done in the way of providing any special forage for bees. Yet bee-fanciers are always interested in observing which are the flowers that the bees prefer; and there are certain well-established conclusions as to the kind of district and seasons which are the likeliest to produce a good honey-harvest. There is an old saying, that a country which produces the finest wool also yields the best honey; and a pastoral district is decidedly better than one under tillage. The principle of the

matter is, that the bees are best suited with a long dry season—an early spring, a hot summer, and a late autumn. As not one of these blessings can be commanded by the apiarian, his art must be applied to provide some mitigation of the injury suffered by the bees when the season is short or wet. For early spring, the crocus, the blue hepatica, and the violet all afford good supplies of pollen and honey, and, if cultivated near the apiary, will be of great service when the wild flowers are backward. All varieties of the willow and poplar furnish early supplies of honey, as well as of the propolis of which we have spoken; the blossoms of the gooseberry and currant are very useful for the bees in May. Wet, when it enters flowers of any kind, prevents the tongue of the bee from reaching the secret source of honey. On this account, it is well to know, as does the bee, that the drooping blossoms of the raspberry escape the effect of the showers, and honey is gathered from them when other flowers are drenched within as well as without. For a similar reason, borage (*Borago officinalis*) is valuable for bees; and also because that plant continues to flower until the frosts set in. The honey both from raspberry blossoms and borage is very superior. Mr. Langstroth says, that “the precipitous and rocky lands of New England, which abound with the wild red raspberry, might be made almost as valuable as some of the vine-clad terraces of the mountain districts of Europe.” The “golden rod” and also asters afford superior honey for autumn gather-

ing. Dzierzon strongly recommends buck-wheat being sown in the winter stubbles on behalf of the bees, and he tries hard to persuade farmers that it is to their interest to cultivate it. It should be named that all the ordinary fruit blossoms, especially those of the apple, supply abundant store for bees.

It is, however, to wild or field flowers that the bee-master must chiefly look for the raw material on which his myriad artisans shall exert their skill. The white clover of the pasture*—the wild thyme on the hill—the heather on the moors—the furze and the broom on the sandy waste—offer exhaustless stores for a greater number of bees than can ever be located near them. Lime-trees, when in blossom, and mignonette are also most valuable resources. There are also two or three peculiar sources of honey which one would not have suspected, as, for instance, the blossoms of the onion plant, of turnips, and, in still greater degree, the flower of the mustard plant.

In those districts of England where mustard seed is cultivated so extensively, it would be well worth while for the farmers to keep large colonies of bees. Another, but a very uncertain, source of honey is the "honey-dew," which, in some seasons, appears in large quantities on the leaves of the oak, the lime, and some other trees.

* It is a good practice to induce the owners of adjacent fields to sow clover-seed.

It is important to mention that bees, in the principal breeding season, require a plentiful supply of water. Owing either to their carelessness or eagerness, they are frequently drowned when drinking from any large quantity of water ; the bee-keeper should, therefore, place near the hives shallow vessels of water containing pebbles, on which the bees may alight to take frequent but temperate draughts.

THE LIGURIAN OR ITALIAN ALP BEE.

A new, or rather a re-discovered, variety of bee has recently been brought into practical use amongst apiarians in Germany and America, as well as in this country. The ordinary bee is the *Apis mellifica* of naturalists ; the new kind is the *Apis ligustica*. It was also named "the Ligurian Bee" by the Marquis de Spinola, who found it in Piedmont in 1805 ; and he considered it to be the principal species known to the Greeks, who speak of the "best kind" of bee as being of a red colour. Leading apiarians agree in pronouncing these bees to be justly entitled to the high character given them. (See coloured engraving, Plate I., figs. 1, 2, 3.) Their special advantages are—greater fecundity of the queens, less irascibility, and a more handsome appearance, for, being of a golden colour, they are prettier than our black bees.

Tennyson most probably refers to these Ligurian

bees in the following stanza of his beautiful poem "Eleanore" :—

"Or the *yellow banded bees*,
Through half-open lattices,
Coming in the scented breeze,
Fed thee, a child, lying alone,
With whitest honey in fairy gardens culled :
A glorious child, dreaming alone
In silk soft folds, upon yielding down,
With the hum of swarming bees
Into dreamful slumbers lulled."

Our own experience with the Italian Alp bee enables us to corroborate the statements which have been made in favour of this new variety. We find the queens more prolific than those of the common kind, and the quantity of honey produced is greater. These two facts stand as cause and effect: the bees being multiplied more quickly, the store of honey is accumulated more rapidly, and the Italian bees consume, if anything, less food than the common kind. When of pure Italian blood, these bees are, by some apiarians, thought to be hardier than our own. That they forage for stores with greater eagerness, and have little hesitation in paying visits to other hives, we can testify from our own observation. The following anecdote will illustrate their intrusive propensities :—Another bee-keeper living in the neighbourhood of our apiary, when inspecting our hives, observed the yellow bees: he exclaimed, "Now, I have

found out where those strange-looking bees come from ; for," said he, " these yellow-jackets are incessant visitors to my hives. I thought they were a species of wasp that had come to rob, and until now I have been unable to account for their appearance at the entrance of my hive, so that I have killed them by hundreds." This was not at all pleasing intelligence for us, and we trust that our neighbour has been more lenient to " the yellow-jackets " since his visit, for such summary capital punishment was wholly unmerited, because, when a bee is peaceably received (see page 127), it becomes naturalized, and works side by side with the others in its fresh abode. We are inclined to believe that more visiting takes place amongst bees of different hives than bee-keepers have been accustomed to suppose: where the Italian and black bees are kept near each other, the foreigners being conspicuous by their lighter colour, there is less difficulty in identifying them when at the entrance of other hives.

In the season of 1864, we had more honey from a Ligurian stock than from any one of our colonies of black bees. From this Ligurian hive we have taken a glass super containing 40 lbs. nett of honey, besides having drawn from it an artificial swarm ; and, after all, it remains the strongest hive in our apiary.

The Baron Von Berlepsch and Pastor Dzierzon, who are probably the two most intelligent and skilful bee-keepers of Germany, award to the Italian a very decided

preference over the common bees. The Baron says that he has found :—" 1. That the Italian bees are less sensitive to cold than the common kind. 2. That their queens are more prolific. 3. That the colonies swarm earlier and more frequently. 4. That they are less apt to sting. 5. They are more industrious. 6. That they are more disposed to rob than common bees, and more courageous and active in self-defence. They strive, whenever opportunity offers, to force their way into colonies of common bees ; but when strange bees attack their hives, they fight with great fierceness and with incredible adroitness."

It is said that the Italian bee can extract honey from some flowers which the common bee is unable to penetrate. For instance, the blossom tubes of the red clover being too deep for the probosces of the common bees, that flower is useless to them, although so plentiful ; but, says Mr. Langstroth, the American apiarian, the Italian bee visits the red clover assiduously, and draws large quantities of honey from it.*

The introduction of this new variety of bee into England was through our agency. M. Hermann, a bee-cultivator at Tamins-by-Chur, Canton Grison, Switzerland, wrote to us on the 5th July, 1859, offering to supply us with Italian Alp queen-bees. This letter, or an extract from it, appeared in the current number of the

* This opinion is not held by the closest observer of Italian bees in England.

Journal of Horticulture (then called the *Cottage Gardener*), a periodical that regularly opens its columns to apiarian subjects. Prior to this the Italian Alp, or, as it has been named, the "Ligurian" bee, was UNKNOWN IN THIS COUNTRY, except to a few naturalists. The letter referred to attracted the attention of that intelligent apiarian, T. W. Woodbury, Esq., now so well known as the "Devonshire Bee-Keeper." On the 19th of July, that is, a fortnight after M. Hermann's offer, we received a consignment of Italian Alp bees,—the first imported into England. With these Mr. Woodbury also received one queen-bee and a few workers, which he introduced into a hive of English bees from which the queen had been taken. His efforts were very successful, and "the spring of 1860 found him in possession of four Ligurianized stocks." His subsequent experience with the Italian Alp bee he has fully described in a communication to the *Bath and West of England Agricultural Journal*.

Subsequently, M. Hermann sent us a copy of his pamphlet, entitled "The Italian Alp Bee; or, the Gold-Mine of Husbandry," with the request that we should have it translated from the German, and that copies of it should be printed in the English language. The pamphlet was speedily published by us, and although singular as a literary production, it may be useful for the advanced apiarian.

Certainly the bees are partially of an orange or golden colour, and if one could believe the golden anti-

cipations indulged in by M. Hermann respecting them, it would be sufficient to identify the Italian Alp bee as the species described by Hood in "Miss Kilmansegg";—those which dwelt in

"A golden hive, on a golden bank,
Where golden bees, by alchemical prank,
Gather gold instead of honey."

If we are correctly informed, poor Hermann himself has not yet greatly profited by the discovery of the mine. He appears to have quitted Switzerland, and travelled to America, as, by the latest accounts, we learn that he is now in the neighbourhood of Philadelphia, prosecuting his favourite calling with his accustomed ardour, among the apiaries of amateur bee-keepers. We are glad that M. Hermann is thus engaged, for report had reached us that he was dead—a report to which we gave currency in our first edition.

In the pamphlet referred to, M. Hermann gives the following description of what he insists on designating as *Apis Helvetica*:—"The yellow Italian Alp bee is a mountain insect; it is found between two mountain chains to the right and left of Lombardy and the Rhetian Alps, and comprises the whole territory of Tessins, Veltlin, and South-Graubunden. It thrives up to the height of 4,500 feet above the level of the sea, and appears to prefer the northern clime to the warmer, for in the south of Italy it is not found. The Alps are their

native country, therefore they are called Yellow Alp-bees, or tame house-bees, in contradistinction to the black European bees, whom we might call common forest bees, and who, on the slightest touch, fly like lightning into your face. (?)

“As all good and noble things in the world are more scarce than common ones, so there are more common black bees than of the noble yellow race, which latter inhabit only a very small piece of country, while the black ones are at home everywhere in Europe, and even in America.”

Notwithstanding the emigration of M. Hermann from his native land, we shall in future be able to supply all bee-keepers who may wish to possess stocks of the genuine yellow Alpine bees.

The Italian varies but little from the common bees in its physical characteristics. The difference in appearance consists in the first rings of the abdomen, except the posterior edge, and the base of the third, being of an orange colour instead of a deep brown. These orange-coloured parts are transparent when closely examined with the sun shining on them. The Italian bees are more active than common bees when on the wing,

During the summers of 1859 and 1860 we had over from the Continent a great number of Ligurian queens; these were sent to all parts of the kingdom. We regret to say that but few were successfully united to English

stocks. It requires a considerable amount of apiarian skill to accomplish the union,* so that we find by experience it is best to send out complete Ligurian stocks. This is particularly desirable now that the packing of whole hives is so easily accomplished by us with the aid

* The plan of uniting an Italian queen to an English stock is, first, to discover the queen by lifting out the frames, then take her away. This, we find, is best done by putting a wine-glass over her whilst on the comb, and, with a card a little larger than the diameter of the glass, very carefully and gently passed underneath, so as not to injure her majesty, she is thus, with a few of her subjects, made a prisoner, and easily removed. Be careful to cut away with a penknife all queen-cells. Let the hive remain queenless for twenty-four hours, and then place the Italian queen in a small wire cage, the openings of which must be large enough to enable her to receive the attentions of, and to communicate with, her new subjects, and, at the same time, to defend her from the animosity with which bees regard a stranger-queen, that has a scent different from that of her new home. Three or four days' intercourse through the wire meshes generally has a reconciling effect, and the Italian queen may be let go free to become the monarch of the hive. Sometimes, even with all this precaution, the foreigner is slain, so that it is well to preserve the black queen alive (with a few of her own subjects), by feeding and keeping her warm until the result is known. The wire cage containing the new queen is made of a flat shape, so as to be pressed down between the combs, against some honey-cells, in order that, should the inhabitants of the hive be inattentive, her majesty need not starve, but have food within reach. As it is generally considered that the queen is fed by working bees, it is always necessary to put about half a dozen of *her own subjects* in the cage with her, to pay her the requisite attention.

of bars and frames. We have sent a great number of stocks to all parts by rail.

Mr. Woodbury, owing to his knowledge and skill in bee-keeping, was eminently successful in propagating the Ligurian bees first imported into this country; and we would recommend all who may be interested in the subject to peruse the interesting articles written by him in the *Journal of Horticulture*. He has shown great patience and energy by his labours in the rearing of queens and the multiplication of stocks, for which he merits all praise.

We now add to the testimonies already cited that of Mr. Woodbury, as to the superior qualities of Ligurian bees. The following is extracted from the paper contributed by him to the *Bath and West of England Agricultural Journal*:—"From my strongest Ligurian stock I took eight artificial swarms in the spring, besides depriving it of numerous brood-combs. Finding, in June, that the bees were collecting honey so fast that the queen could not find an empty cell in which to lay an egg, I was reluctantly compelled to put on a super. When this had been filled with 38 lbs. of the finest honeycomb,* I removed it, and as the stock-hive (a very large one) could not contain the multitude of bees which issued from it, I formed them into another very large

* This super was exhibited at our stand in the International Exhibition of 1862.

artificial swarm. The foregoing facts speak for themselves; but as information on this point has been very generally asked, I have no hesitation in saying that I believe the Ligurian honey-bee infinitely superior in every respect to the only species that we have hitherto been acquainted with."

In a private letter received from Mr. Langstroth, he informs us that he has, in the season of 1865, bred over 300 Ligurian queens; these he has disseminated to various bee-masters on the American continent, and the united opinion of apiarians in that country is increasingly in favour of the decided advantage of the cultivation of the Italian bee.

After such emphatic testimony as this, corroborated, as it is, by many other observers, there seems every reason to expect that the Ligurian bee will gradually supersede the common kind throughout the United Kingdom. The honey-bee of the Holy Land is the Ligurian.

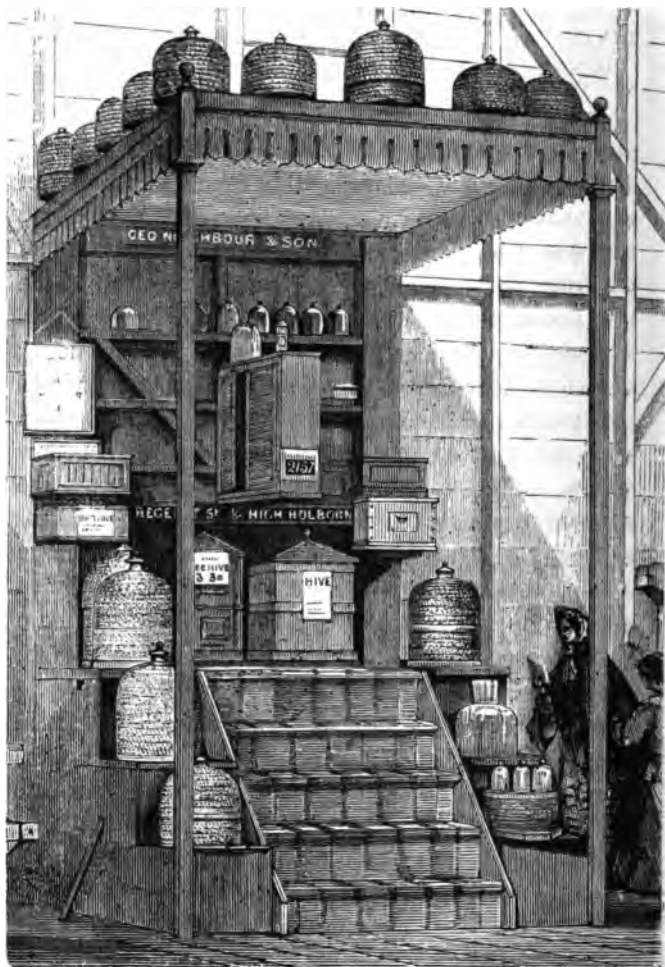
The Rev. H. B. Tristram, M.A., in his valuable book, "The Land of Israel," has the following interesting account of the bees in that country:—In Palestine bee-keeping is not an unimportant item of industry, and every house possesses a pile of bee-hives in its yard. Though similar in its habits, the hive-bee of Palestine is a different species to our own. "We never," he says, "found *Apis mellifica*, L., our domestic species, in the country, though it very possibly occurs in the north; but the common Holy Land insect, *Apis ligustica*, is amazingly

abundant, both in hives, in rocks, and in old hollow trees. It is smaller [?] than our bees, with brighter yellow bands on the thorax and abdomen, which is rather wasp-like in shape and with very long antennæ. In its habits, and especially in the immense population of neuters in each community, and in the drones cast forth in autumn, it resembles the other species. Its sting, also, is quite as sharp. The hives are very simple, consisting of large tubes of sun-dried mud, like gas-pipes, about four feet long, and closed with mud at each end, leaving only an aperture in the centre, large enough for two or three bees to pass at a time. The insects appear to frequent both doors equally. The tubes are laid in rows horizontally, and piled in a pyramid. I counted one of these colonies, consisting of seventy-eight tubes, each a distinct hive. Coolness being the great object, the whole is thickly plastered over with mud, and covered with boughs, while a branch is stuck in the ground at each end, to assist the bees in alighting. At first we took these singular structures for ovens or hen-houses. *The barbarous practice of destroying the swarms for their honey is unknown.* When the hives are full, the clay is removed from the ends of the pipes, and the honey extracted with an iron hook; those pieces of comb which contain young bees being carefully replaced, and the hives then closed up again. Everywhere during our journey we found honey was always to be purchased; and it is used by the natives for many culinary purposes, and especially

for the preparation of sweet cakes. It has the delicate aromatic flavour of the thyme-scented honey of Hybla or Hymettus.

"But, however ~~extensive~~ are the bee-colonies of the villages, the number of wild bees of the same species is far greater. The innumerable fissures and clefts of the limestone rocks, which everywhere flank the valleys, afford in their recesses secure shelter for any number of swarms; and many of the Bedouin, particularly in the wilderness of Judæa, obtain their subsistence by bee-hunting, bringing into Jerusalem jars of that wild honey on which John the Baptist fed in the wilderness, and which Jonathan had long before unwittingly tasted, when the comb had dropped on the ground from the hollow tree in which it was suspended. The visitor to the Wady Kurn, when he ~~sees the busy~~ multitudes of bees about its cliffs, cannot but recall to mind the promise, 'With honey out of the stony rock would I have satisfied thee.' There is no epithet of the Land of Promise more true to the letter, even to the present day, than this, that it was 'a land flowing with milk and honey.'"

Does not evidence such as this point to the conclusion that the bees which Sampson found in the carcase of the lion were *Ligurian*; and may we not further speculate that the ribs of the carcase constituted the first *bar-hive*? Surely, "there is no new thing under the sun."



LIVING BEES AT THE INTERNATIONAL EXHIBITION OF 1862, SENDING BEES TO AUSTRALIA, &c.

The engraving represents our stand in the Agricultural Department of the International Exhibition of 1862. The space granted us in the World's Great Fair was somewhat limited; but we were able to exhibit a tolerably complete stock of apiarian apparatus, and all the more important bee-hives. Amongst these was an uncomb hive stocked with the Yellow Alpine or "Ligurian" bee. This was an object of great attention, and daily hundreds of visitors flocked round our stand, in order to watch the movements of the Italian queen, with her gay and busy subjects. The entrance-way for the bees being in the "Open Court," to which all visitors had access, it was necessary to place the hive in an elevated position, so as for it to be beyond the reach of incautious passers-by, and to obviate any chance of annoyance to the vast crowds of people continually around.

Among others who took a deep interest in our exhibition was Mr. Edward Wilson, President of the Acclimatisation Society of Victoria. This gentleman requested us to pack four stocks of the Ligurian bees for conveyance to Melbourne. With the assistance of Mr. Woodbury—whose aid was, indeed, essential—these stocks were sent off on the 25th of September, 1862, by the steam ship *Alhambra*, so as to arrive at the colony during the Austral summer. The hives were Woodbury

frame hives, having ample space and ventilation, as well as the means of supplying water to their inmates during the voyage; there was, also, a sufficient store of honey to last until the following March. The bees arrived at Melbourne, where they were released after an imprisonment of seventy-nine days, and have since rapidly multiplied, the climate and pasturage of Australia greatly favouring the increase of this superior variety of the bee.

Mr. Wilson was so well pleased with the careful manner in which these stocks were fitted out for their voyage across the seas, that he subsequently instructed us to prepare him three more hives, which were sent out in a sailing vessel. Owing to the mismanagement of the water supply during the voyage, only one stock survived in this instance. Mr. Wilson informs us that one of these hives contained 136 lbs. of honey, on the 25th of December, 1864 (Midsummer in Australia).

Upwards of twenty years ago, we sent a Nutt's hive stocked with bees to New Zealand. We then adopted the plan of fixing the hive in a meat safe, so that the bees could fly about a little, and also cleanse the hive of their dead, for bees are very attentive to sanitary arrangements; they always remove the dead ones from their midst, and do not void excrement within the hive.

When bees are shut up in their hives too long, even with adequate ventilation, they are apt to be attacked by a disease called by apiarians dysentery. Sometimes, when confined by the unfavourableness of the weather

in winter, or the lateness of spring, this disease produces serious mischief amongst the bees. Various remedies have been recommended; but we believe the best is to see that there is wholesome food within the hive, and plenty of it, and, when fine weather returns, the health of the bees will return with it. Dampness of the hives, and too late feeding in the autumn, are also frequent causes of this disease.

BEE-KEEPING IN LONDON.

There are many persons now in this noisy city pent, who frequently remember the days of childhood, when, among pastures of clover, or amidst flowery heath and woodlands, they listened to the cheerful hum of bees. Partly from a desire to revive these old associations, and also from a natural liking for the tendance of living creatures, such persons would be glad to keep bees if they thought it possible to do so in London or its suburbs with any chance of success. We do not wonder that many should doubt even the possibility of bees feeding themselves amidst such an "endless meal of brick;" but we can easily prove that bees, if not placed too near to smoky chimneys, are able to produce honey, both for themselves and for their masters. To make this plain, we will mention some special instances of metropolitan bee-keeping.

About ninety years ago, a Mr. Wildman kept a beehouse and honey warehouse, near to Middle Row,

Holborn. He was not only a tradesman, but was also the apiarian of his day. He kept hives of thriving bees on the roof of his house in Holborn, and many of the nobility and gentry used to mount thither, in order to inspect the apiary. At that period, St. Pancras was a "village two miles north-west of London," and what is now the Regent's Park was open country. It was then much easier for London bees to find their favourite forage, but Mr. Wildman believed that his hives were filled with stores from a considerable distance. Whilst enjoying his country rambles on Hampstead Heath, he had a shrewd suspicion that many of the bees he there observed gathering honey were labourers from his own apiary. In order to identify his own flock amongst the rest, he hit upon a homely but very effective expedient. Having borrowed Mrs. Wildman's "dredging box," he stationed himself near the entrance of his hives, and gently dusted his bees with flour as they issued forth. He then betook himself to Hampstead, where he found his previous surmise confirmed, for there were numbers of his bees in their livery of white.

Wildman became noted for the remarkable control he obtained over his bees, many instances of which he exhibited before the public. Several of his operations with them were regarded as feats of legerdemain by the uninitiated, as when he appeared before King George III., with a swarm of bees hanging in festoons from his chin, or suspended in a cluster at arm's length. The

Journal of Horticulture recently, in alluding to Wildman, gives the following particulars as to his performances :—

“Near the ‘Three Hats,’ Islington, was a place of popular entertainment called “Dobney’s Tea Gardens,” kept by Mrs. Ann Dobney. These gardens occupied the ground between White Lion Street and Winchester Place, and were established as far back as 1728. In 1771, the house was taken for a short time as a boarding school; but it was soon changed to its original purpose as a place of amusement, for, in 1772, Daniel Wildman exhibited bees here. This is a copy of the advertisement :—

“‘June 20, 1772. Exhibition of bees on horseback! at the Jubilee Gardens, Islington (late Dobney’s), this and every evening, until further notice (wet evenings excepted).

“‘The celebrated Daniel Wildman will exhibit several new and amazing experiments, never attempted by any man in this or any other kingdom before. The rider standing upright, one foot on the saddle and one on the neck, with a mask of bees on his head and face. He also rides standing upright on the saddle with the bridle in his mouth, and, by firing a pistol, makes one part of the bees march over the table, and the other swarm in the air and return to their hive again, with other performances too tedious to insert. The doors open at six; to begin at a quarter before seven. Admittance :—Box and gallery, 2s.; the other seats, 1s.’”

The secret of Wildman’s skilful manipulation is well understood now; it consisted in a careful holding and disposal of the queen, together with confidence in the generally inoffensive disposition of bees. Dr. Evans, whom we have often quoted for his correct information in apiarian matters, thus speaks of his feats :—

"Such was the spell which, round a Wildman's arm,
Twined in dark wreaths the fascinated swarm;
Bright o'er his breast the glittering legions led,
Or with a living garland bound his head.
His dextrous hand, with firm, yet hurtless hold,
Could seize the chief, known by her scales of gold,
Prune, 'mid the wondering train, her filmy wing,
Or o'er her folds the silken fetter fling."

To recur to our subject. After the days of Wildman, our own establishment in Holborn became widely known for bee-hives and honey. Although we never attempted to start a London apiary at all approaching in extent that of our predecessor, we have occasionally kept bees on the house-top, both in Holborn and Regent Street. At each of those situations, we have noticed that the bees bring "pollen" as well as honey into their hives. Last summer, there was brought under our notice an illustration of the acuteness of the scent of bees and of their diligent search for food, proving, too, that if sweets can be obtained even from unusual sources, the bees will find them out. A poor woman, who, at the corner of an adjacent street, vends "brandy balls," "toffee," "rock," and other saccharine compounds—all well known to and appreciated by most juveniles,—used to receive frequent visits from our bees. Their visits to the old dame's domain were at first rather interesting, and if the few pioneers who had the sagacity to find such a store had kept the secret only to themselves, their com-

pany would not have been objected to. Such selfish policy does not, however, accord with the social instinct of bees, and these soon informed their companions of the good fortune provided for them in an archipelago of sugar islands. Day by day the swarms of these uninvited visitors increased, until all legitimate customers were beaten off; and the old dame had to see, not only her hope of gain destroyed, but her stock of "goodies" sensibly diminishing by the thefts of these brigands of the air. She could not, or dare not attempt to, drive the intruders away, so made diligent inquiry as to where the robbers were harboured. Having traced them to our establishment in Regent Street, she came to implore of us to move the bees if possible, or she would have to move her stall, and so lose her "connection" in the "toffee" and "rock" trade. Wishing not to hinder the poor woman in gaining her livelihood, we decided on removing our bees into the country.

It is difficult to assign an exact limit to the distance that bees will go in search of honey-yielding blossoms. It has been proved by various experiments that they will fly, say, five or six miles, if the supplies are scanty within a shorter radius; but bees well understand that first of all economies, the saving of time, and if they can find forage near at hand, they prefer it. Hence, other things being equal, the quantity of honey stored will be in proportion to the contiguity of good pasturage. In this way it is that the systematic removal of hives, as

practised in many districts, has such a notable effect on the honey harvest.

A novel sight for Londoners to witness occurred in June, 1865. A swarm, having been ordered to be sent into the country the following morning, was temporarily placed on the leads at the back of our house, 149, Regent Street. The sun shining hot on the hive, or some other cause, induced the inmates to decamp. A passer-by called in to inform us that some bees had arrested the progress of a cab. We at once conjectured that they were those of our missing swarm, the absence of which had previously puzzled us not a little; so we sent our man with a straw hive to bring the truants back, which he succeeded in doing, followed to the door by a crowd, who were amazed at the sight of the "'oney-bees," as the Cockney lads called them. Cabby had to be compensated for the loss of his fare, for the affrighted passengers had left him in a hurry, so that, altogether, no little commotion was caused—a crowd so soon collects in London streets. Among the lookers-on appears to have been a reporter from the *Times* newspaper, for, two days afterwards, the following paragraph appeared in the leading journal:—

“A SWARM OF BEES IN BURLINGTON STREET.—On Wednesday afternoon, about five o'clock, not a little excitement and astonishment was caused in New Burlington Street, Regent Street, by the circumstance of a swarm of bees alighting on a cab which had just drawn up at the Burlington Restaurant. A man having procured a hive, set to work, and, with assistance, succeeded in securing the whole of the unexpected visitors, and took them

away. A swarm of bees is rarely, if ever, seen in the streets of London, but it is not an uncommon occurrence for a swarm to stray considerable distances."

The reporter was, of course, unaware that, instead of the bees having "strayed" so far as he represented, they were brought into London by rail, and had made but a short flight from their temporary home.

During several years we kept bees in the Zoological Gardens, Regent's Park, and have there frequently taken full and handsome glasses of honey. The position of our apiary was on the site now occupied by the new monkey house. The Society promise to erect a new building for an apiary in the course of the ensuing summer. The visitors to the gardens found considerable interest in watching the bees in our glass hives, and are now much disappointed at the absence of so entertaining an exhibition. A collection of these hives are now exhibited by the Acclimatisation Society of Great Britain, with living bees in them, at the Fish Department of the Royal Horticultural Gardens, South Kensington.

A gentleman residing in St. James's Place has, for some considerable time past, kept bees in his garden there. He uses our improved cottage-hives, and his bee-keeping is decidedly successful, as he generally takes some fine glasses of honey each season, besides leaving sufficient as winter store for the bees. For a London situation, St. James's Place is a very favourable one ;

the gardens behind the houses pleasantly face the Green Park, so that the bees have an uninterrupted flight to start with. They are also within easy range of the richly-flowered gardens of Buckingham Palace and those of the nobility and gentry who reside around the Parks. To those gardens the bees of St. James's Place resort, without waiting for any licence or certificate from the royal and noble owners of the honey-yielding preserves. Being within a short distance of our establishment, when this gentleman's bees swarm, he generally sends to us for assistance in hiving them.

The neighbourhood of St. John's Wood and, indeed, almost all the suburbs of London are favourable for the production of honey. We mention St. John's Wood because, from the fact of having kept bees there ourselves, we are able to prove by experience that they do well in that locality. We have several customers on nearly all sides of the town, who have each had this year a considerable surplus of honey in their "supers," after leaving sufficient for the bees themselves in the lower or stock hives.

We exhibited in our window, in the autumn of 1864, a super of fine honey from the apiary of Mr. Shirley Hibberd, the proprietor and editor of the *Gardeners' Weekly Magazine*. It consisted of a box containing 20 lbs. nett weight of honey, and was produced at Stoke Newington, only $3\frac{1}{4}$ miles from the General Post Office.

The *Times*' "Bee-Master," whose letters from Tun-

bridge Wells have awakened so much interest in this pleasing pursuit, also commissioned us to exhibit a "super," produced under his own management in that locality. Mr. S. B. Fox, at Exeter, had upwards of 100 lbs. of honey, of excellent quality, though one of his apiaries is quite within the city.

The last has been an excellent honey-yielding season; our own bees, at Dorking, Surrey, have produced us large quantities, and the accounts from nearly all parts of the country coincide in stating that the bees have, in the years 1864 and 1865, enjoyed unusual opportunities for accumulation. In not a few localities, the season of 1863 was even more abundant.

WASPS AND MOTHS.

Bees have few enemies more formidable than wasps. The most effectual method of checking their invasion of hives is to have as narrow an entrance as the bees can do with. If a stock be not very weak in numbers, the bees will be well able to guard a small aperture, and can repel the attacks of those insidious and merciless robbers. On this account, the entrance to our cottage-hive, as described at page 74, may be used.

The bee-keeper is interested in preventing the increase of wasps; it is, therefore, a good practice for him to set a price on queen-wasps in the spring, the death of one of them at that time being equivalent to the destruction of a whole nest.

Should nests be found in the neighbourhood of an apiary, their annihilation must be accomplished either by blowing them up with gunpowder, an operation well understood by most country lads, or any other effectual method. The late Mr. Payne recommended that a small quantity of gas tar should be put into the mouth of a wasps' nest, and if then covered with earth, the total destruction of the wasps will be accomplished without further trouble. But to use blazing straw for the purpose is always dangerous in country districts. We have lately heard of a very ingenious and successful mode of entrapping and killing wasps. Place some sugar or strongly-sweetened compound on the ground in a garden, and place over it a square hand-glass, wedged up an inch or so all round. On this glass, which should have an opening at the apex, lodge another, but a sound one. The wasps, attracted by the sweets, will soon crowd under the lower glass, and, when they have well feasted, will ascend into the upper one; there, between the two, they soon become scorched and perish by the heat of the sun shining on the outer glass.

The season of 1864 was most productive for the increase of these prime pests of the apiary, and many hives have severely suffered by their depredations. When once wasps in any number have gained an entrance into a hive, the bees can seldom eject them, and the invaders generally remain until they have freely regaled themselves from the luscious store. They not only con-

sume the honey, but cause a good deal of worry to the legitimate inhabitants of the hive, as well as killing the foremost defenders of it. Wasps being much superior in strength, it requires at least three bees to master one of them.

Having suffered loss in our own apiary from the attacks of wasps, we feel it desirable to give a detailed account of our troubles from that cause. A Ligurian stock was besieged and worried by wasps to such an extent, that the bees deserted it on the 5th of September, 1864. Fortunately, the bees chose a time for their departure just as we visited the apiary. An unusual turmoil was heard in the hive, such as is experienced at the time of swarming, and on immediately examining the entrance, we observed that the bees were quitting in tumultuous haste. The usual methods that induce bees to settle were tried—amongst others, that of throwing sand up into the air, so that it should fall down amongst the bees on the wing; but they were dispersed in disorder, and their flight extended over three adjacent gardens. We only discovered the clustered bees by diligent search, as the sequel will show. Permission being asked of our next-door neighbour, we searched his garden to see if our bees had alighted there; but found that they had passed over. Making a similar application to the owner of the garden adjoining, we entered, having a straw hive in hand, but no bees were there. After looking diligently all round, and

climbing the wall, thereby gaining a view of the third garden, we perceived in it unmistakable signs of an unwonted commotion. The occupiers of the house were intently looking at a particular part of the garden, and there was a dust-pan and a key, with which the master had been "tanging the bees," to induce them to settle. We quickly made for the proper entrance to the garden, and soon discovered our little wanderers clustered to a large flower-vase. Our neighbours, however, were sadly disappointed of their prize, for the gardener had hastily been dispatched into the town to purchase a hive for the welcome colonists. In depriving our neighbours of a so unexpected and cheaply-acquired treasure, we could sympathise with their regret, having been much disheartened half an hour before at our own loss; but, of course, we could do no other than claim our own bees. We gladly agreed to defray the expense of the straw hive that had been purchased for the sake of our truant swarm. After brushing the bees into the hive, and leaving it propped up with a stick, in order that the stray ones might join, we returned home for an hour or so, to give them time to settle. Judge of our vexation when, on returning to fetch the hive home, we found that the refractory creatures had again taken flight, and that all the work was to do over again. The wasps were not to blame for this second flight of the Ligurians; we judged that the swarm had been disturbed by visits from a colony of bees that we discovered were living the life

of outlaws under the roof of an adjoining house. Although much disheartened and perplexed, we at once renewed our search, and, upon inquiry, found that the missing bees had taken a southerly course across the turnpike road, and it was therefore necessary to ask permission to search the gardens of the houses opposite. From one of these we observed, on looking through the hedge, that the inhabitants of the next house were on the *qui vive*. On inquiring whether they had seen a colony of bees, the wary old dame replied that she "had no bees but her own," and added that "they were very much excited." Having asked permission to go through the hedge to look at her bees, we soon discovered our Ligurians on the top of the old lady's bee-house. There was no difficulty in identifying our own bees; their yellow rings were as good as a private mark. Quickly hiving the swarm, we took them home, and replaced them in the hive they had quitted. It was almost destitute of honey; but by liberal feeding, and lessening the entrance so that only one bee at a time could find ingress or egress, we succeeded in inducing them to rest in their old home. Thus nearly half a day's exertion was needed to save a fine colony, which would otherwise have been utterly lost by the power of the relentless wasps.

Much watchfulness is needed to prevent the loss of swarms, and the foregoing incident may serve to suggest the necessity of having hives so located as to be constantly

within view, either from the dining-room, or of those whose duties oblige them to be near the apiary. If we had not happened to be at hand at the moment this colony started, it would have been irretrievably lost to us. Many swarms and colonies are lost simply because the departure takes place without anyone witnessing it. Let us hope that runaway bees may always fall into the hands of those who are as capable of taking care of them as our neighbours appeared to be on the occasion we have described.

Other formidable enemies of bees are moths. These insects are creatures of the night, as the wasps are of the day, and they make their way into the hives under cover of darkness, in spite of the bee-sentinels. They deposit their eggs in any crevices in or near the hive that they can find. There the warmth of the hive, or of the sheltered situation, causes the eggs speedily to hatch, and then the maggots soon work their way to the comb and larvæ food, which they greedily devour, thereby often bringing about the gradual but certain destruction of the whole community of bees. The best method of keeping moths outside the hives is to lessen the entrance, as before alluded to. Also, in the early spring, the hives should be lifted from their floor-boards, which must then be made thoroughly clean; and all crevices and corners about the hive and stand should be scraped, so as to get rid of all eggs of moths and other insects before the warm weather hatches them or enables

them to do mischief. The bee-moth is not so troublesome in England as it is in America and some parts of Germany; but still its encroachments should be carefully guarded against in this country, for if not, it may easily increase to a very serious extent. In the season of 1865, wasps were as few as they were numerous the preceding year; their paucity was attributable either to frosts in May or to heavy rains in June, which destroyed them in their nests. In general, wasps are great depredators of wall-fruit, but, in the autumn before mentioned, the bees occupied the wasps' foraging-ground. Perhaps never in the memory of bee-keepers did bees feast upon fruit in the same manner. Various reasons have been assigned for this unusual occurrence; some thought that as there were so few wasps the bees were unmolested, and enjoyed the saccharine matter in the fruit without let or hindrance—for bees are about as partial to the company of wasps as mice are to that of rats. Other bee-keepers remarked the sudden and early termination of the honey-gathering, and conjectured that the bees, being anxious to make up their winter store, endeavoured to bring home nectar from the fruit because the weather was unusually fine. There was one feature which is worth remarking: as far as our observation extended, the bees did not, like the wasps, break the skin of sound fruit, but were satisfied with lapping the juice of the ripe fruit that had the skin already broken.

An unusual amount of robbing and fighting occurred in the autumn of 1865 ; the weather remaining fine and warm, and the honey having all but ceased in the flowers, the bees began to assail each other's hives, as usual, the strong attacking the weak. In most years, this spirit of depredation exists, and the bee-keeper should be on his guard not to tempt the avarice of bees by exposing honey, either in the comb or liquid, and also to be very tardy of opening bar and frame hives at this time of year. If needful to do so (soon after sunrise is the safest, because there will be few bees about), take the hive to a quiet corner of the garden, many yards away from the other hives, and do what is requisite speedily, so as not to expose the honey to the scent of a host of robbers, who will most unceremoniously pillage, and cause a terrible commotion. This caution will also be necessary to be kept in view when removing supers. In fact, many liberties that may be taken with bees when they are busy in the gathering season will most wofully disturb an apiary in August or September ; and this plundering spirit may exist even in October.*

DRAINING HONEY FROM THE COMBS.

Those of our readers who prefer eating "run honey" to honey in the comb may be glad of some instruction

* In the spring of the year, great care is also needful as regards feeding and in opening hives.

as to the best way of separating the two. For this purpose, it is better to let the honey run without squeezing, in order to preserve both its transparency and flavour.

Take a sharp knife, and slice the combs on both sides, keeping the knife parallel with the partition wall, so that every cell may be laid open. Place these broken combs in a sieve, or on a piece of muslin stretched across and tied round the opening of a pan or large-mouthed jar. Allow the honey to flow out of the combs spontaneously, and reserve the squeezing process for a separate jar, so that the honey of the first drained jar may be perfectly pure, both in appearance and flavour. That which has pressure put on it will be waxy in flavour and thick. Some persons recommend that the opened combs be placed in the sun, as the heat will cause the honey to run more freely. The great disadvantage of this is, the temptation the honey offers to bees, who will be eager to gain a share. Honey, whilst in the combs, keeps remarkably well when left in the supers; if cut out, the combs should be folded in writing-paper, and sealed up, so as to effectually prevent the free entrance of air: they should then be placed in a warm, dry closet.

Honey, like most vegetable products, should be fresh every year. It may easily be kept from one season to another; but when kept beyond that time, unless very carefully stored in a warm temperature, it will crystallize in the comb, and it is liable to ferment when in jars separated from the comb.

DISEASES OF BEES.

Dysentery is a disease produced either by long confinement, by dampness, or by feeding in the winter. The first thing bees do when disturbed is to fill themselves with food, so that in winter weather, when they cannot get out to void their fæces, hives should not be meddled with, otherwise the complaint may be brought on. It is also engendered in many instances by the state of the weather in winter months, and is indicated by the yellow colour of the excrement, and by its being voided upon the floors and at the entrance of the hives, which bees in a healthy state generally keep clean. All that can be done for them when affected is to well clean or to change the floor-board, and so produce cleanliness. Having made some remarks on this disease at page 214, in connection with bees sent to Australia, we will pass on to the more formidable, but happily less common, malady of "foul brood."

This disease does not attack the bees themselves, but affects the larvæ, by causing them to putrefy in the cells, thus destroying all hope of the rising generation. Bees are exceedingly fond of their young, and are greatly dispirited when their hives are in this plight. In common with most pestilential disorders, no satisfactory cause is assigned for its first appearance. Some apiarists contend that "foul brood" is another name for chilled brood; others, that the queen, by a freak of nature,

deposits some of her eggs the wrong way upwards, and that these putrefy in the cells and contaminate the others. Whatever may be the origin, one thing is very certain, "it is catching;" there is, however, in the circumstance of the adult bees and of those about emerging from the cells not being injuriously affected thereby, a great help to its eradication, as will presently be shown.

There are two kinds of foul brood—one is moist and foetid, the other is dry and not contagious, the brood merely drying up in the cells, and, from its partial character, is probably within the power of the bees themselves to overcome. In the former, instead of drying up, the brood remains dark and slimy in the cells, and emits a most unpleasant odour, perceptible at some distance from the hive.

In the year 1848, Pastor Dzierzon lost a large number of stocks from this disease; he, however, was enabled to banish it from his apiary, and communicated to a German bee-journal very wholesome advice, which Mr. Langstroth quotes, and from which we make an extract:—"When the malady makes its appearance in only two or three of the colonies, and is discovered early (which may readily be done in hives having movable combs), it can be arrested and cured without damage or diminution of profit. *To prevent the disease from spreading in a colony, there is no more reliable and efficient process* THAN TO STOP THE PRODUCTION OF BROOD; for where no

brood exists, none can perish or putrefy. The disease is thus deprived both of its aliment and its subjects. The healthy brood will mature and emerge in due time, and the putrid matter remaining in a few cells will dry up and be removed by the workers. All this will certainly result *from a well-timed removal of the queen* from such colonies. If such removal becomes necessary in the spring or early part of the summer, a supernumerary queen is thereby obtained, by means of which an artificial colony may be started, which will certainly be healthy if the bees and brood used be taken from healthy colonies. Should the removal be made in the latter part of summer, the useless production of brood will at once be stopped and an unnecessary consumption of honey prevented. Thus, in either case, we are gainers by the operation."

In cases where the disease assumes a more malignant character—in other words, "has got ahead," through "not being nipped in the bud,"—it will be well to take notice of another quotation from Mr. Langstroth's book :—"In the spring or summer, when the weather is fine and pasturage abounds, the following cure is recommended by a German apiarian :—'Drive out the bees into any clean hive, and shut them up in a dark place without food for twenty-four hours ; prepare for them a clean hive, properly fitted up with comb from healthy colonies ; transfer the bees into it, and confine them two days longer, feeding them with pure honey.'"

Mr. Woodbury's apiary was severely attacked by this

disease in the spring and summer of 1863. The writer happened to be on a visit to him at this juncture, and witnessed him withdrawing infected combs from hives that were literally masses of corruption, the brood-cells of which, on being opened with a pointed instrument, revealed the dark brown slimy matter before alluded to, and from which arose a most unpleasant smell. Mr. Woodbury communicated to the *Journal of Horticulture*, of July 21, 1863, an exact and graphic account of his misfortunes, headed "A Dwindling Apiary." Finding that the removal of the putrid matter must be simultaneously effected and the bees driven out and placed in hives that had undergone a complete purification, Mr. Woodbury set about endeavouring to accomplish his object, and was so far successful, that he was able to furnish an article to the before-named journal of August 4th, under the more cheerful title of "Convalescent," in which he says: "First, let me indorse the opinions both of Dzierzon and Rothe, that, except under very especial circumstances, it is unadvisable to attempt the cure of a foul-breeding stock: better, far better, to consign its inhabitants to the brimstone pit; the hive itself, if a straw one, to the flames; the comb to the melting pot; and appropriate the honey to any purpose, except that of feeding bees."

Mr. Woodbury further says: "Before starting, it was requisite to insure the transfer of the bees to unpolluted hives; and here I found that Dzierzon declares that every

hive that has contained a foul-breeding colony should be exposed to the sun and air for two years before being re-stocked. In my own case, this was simply impossible, and I therefore adopted the practice of another German writer on the subject, viz., to scrape out the hive very carefully, wash it all over with a saturated solution of chloride of lime, keeping it closely shut up for twenty-four hours, and then, after thoroughly washing it with clean water, exposing it to the sun and air until the smell of the disinfectant had passed off. This method has the advantage of enabling one to use a wooden hive again after a lapse of a couple of days, and is, I believe, thoroughly effectual."

Mr. Woodbury then captured the queen, secured her in a "cage," and placed her in a clean empty hive; all her bees were brushed from their combs into it as rapidly as possible, in order to prevent their carrying much of the infected honey with them, whilst the combs themselves were set draining out of the bees' reach, and consigned as quickly as possible to the melting pot. After the lapse of three or four days, the queen (still imprisoned) and bees were again transferred to another clean hive, furnished with a few pure combs, and in this they were suffered to remain, their queen being released in a day or two, as soon as they appeared contentedly settled. Mr. Woodbury gives another important hint that operations of this kind with tainted combs should be performed out of reach of robber-bees from adjacent hives, lest they

should carry the infection to their respective houses. By the before-mentioned process, Mr. Woodbury succeeded in completely extirpating foul brood from his apiary in 1863, and has had no return of it since. English apiarian writers have made so little allusion to this disorder, that some of our older bee-keepers contend that modern hives and foreign bees have something to do with bringing it about. To show that the disease made its appearance in former days, there is a chapter on this subject in Bonner's "Bee-Keeper's Companion," published at Berwick, in 1798, entitled, "An uncommon Disaster which sometimes, though rarely, happens to Bees," which Mr. Woodbury quotes at length in the *Journal of Horticulture*. Bonner, after recounting therein his observations of the dwindling state of his apiary for which he could not account, says: "He saw plainly that the young were all going backward in the cells, and that he looked down between the combs, but was unable to proceed for the stench that the rotten maggots produced." Mr. Langstroth writes that "Aristotle speaks of a disease which was accompanied with a disgusting smell, so that there is reason to believe that foul brood was known two thousand years ago."

When we take into consideration how sorely our farmers are perplexed by the cattle plague, known as the rinderpest, concerning which so many conflicting opinions exist (and the same may be said of the recommendations for its cure), can we wonder that our little

favourites should occasionally be liable to disorders of this sort, which puzzle even experienced bee-keepers? In the hope of allaying unnecessary alarm, we would just add that "foul brood" is not a very general complaint, and, so far as our observation extends, has been most fatal in large experimental apiaries, where extensive propagation has necessarily had to be pushed forward. With the experience and advice already gained, this disorder may now be said to be deprived of its terrors.

GENERAL REMARKS.

Every bee-keeper should be a book-keeper; that is, so far as to have a permanent record of the events of the apiary and the fortunes of his bees. A book similar to a tradesman's journal would be very suitable for the purpose. In it he should note down the date of the first swarm of the season especially, and those of the other swarms also; and in autumn, the quantity of honey taken from each hive should be entered, with remarks on the probable size of the various stocks. These particulars will not only be interesting for the bee-keeper to turn to in winter, but will be of practical service in enabling him to know the exact age and probable strength of each stock. The bee-book may also be contrived to show the total amount of honey that the bees have produced for their owner, and the net money profit of the apiary. A simple and clear account like this—provided,

by the bye, that it does show a satisfactory balance—will be very useful for inducing cottagers and farm-labourers to start bee-keeping. Nothing like ocular demonstration for this class. The “humane” apiarian will reason with them in vain, until he shows them a monster “skep” of honey, and mentions the price that it will fetch in the market. When convinced that the depriving system will pay, the cottager will gladly adopt it.

A writer in the *Quarterly Review* gives the following good advice :—“Don’t bore the cottager with long lectures ; don’t heap upon him many little books ; but give him a hive of the best construction, show him the management, and then *buy his honey* ; *buy* all he brings, even though you should have to give the surplus to some gardenless widow. But only buy such as comes from an improved hive—and you cannot easily be deceived in this,—one which preserves the bees and betters the honey. Then, *when you pay him*, you may read to him, if you will, the wise rules of old Butler, *exempli gratiâ* :—

“ If thou wilt have the favour of thy bees that they sting thee not, thou must not be unchaste or uncleanly ; thou must not come among them with a stinking breath, caused either though eating of leeks, onions, or garlic, or by any other means, the noisomeness whereof is corrected by a cup of beer ; thou must not be given to surfeiting or drunkenness ; thou must not come puffing or blowing unto them, neither hastily stir among them, nor violently defend thyself when they seem to threaten thee ; but, softly moving by, thy hand before thy face, gently put them

by ; and, lastly, thou must be no stranger to them. In a word (or rather in five words), be chaste, sweet, sober, quiet, familiar ; so they will love thee and know thee from all others.' "

Allusion 'having been made to the profit that may be gained by the judicious management of bees, we will illustrate that point by relating an anecdote of a certain French *curé*.* It is one which may be suggestive to some of the rural clergy in this country, who might almost as easily keep an apiary as they do a garden or an orchard.

A good French bishop, in paying his annual visit to his clergy, was very much afflicted by the representations they made to him of their extreme poverty, which, indeed, the appearance of their houses and families corroborated. Deploring the sad state of things which had reduced them to such a condition, he arrived at the house of a curate, who, living amongst a poorer set of parishioners than any he had yet visited, would, he feared, be in a still more woful plight than the rest. Contrary, however, to his expectations, he found the appearance of this remote parsonage to be superior to those he had already visited. Everything about the house wore the

* This story, in a disguised form, or, as the writer would say, an improved form, was quoted in the *Cornhill Magazine* some time ago. In transforming the bee-keeping *curé* into an English clergyman, the effect was cleverly enhanced, especially as to the dismay of the decorous English prelate in hearing that his poor brother in the Church had turned "manufacturer ;" but then the *vraisemblance* of the story, as we have it, was destroyed.

aspect of comfort and plenty. The good bishop was amazed. "How is this, my friend?" said he; "you are the first pastor I have met with having a cheerful face and a plentiful board! Have you any income independent of your cure?" "Yes, sire," said the pastor; "I have : my family would starve on the pittance I receive from the poor people that I instruct. If you will walk into the garden, I will show you the stock that yields me such excellent interest." On going into the garden, he showed the bishop a long range of bee-hives. "There," said he, "is the bank from which I draw an annual dividend, and it is one that never stops payment." His harvest of honey enabled him almost to dispense with the use of sugar, leaving him a considerable quantity for disposal in the market; of the coarser portions he made a tolerable substitute for wine, and the sale of the wax nearly paid his shoemaker's bill. Ever afterwards, when any of the clergy complained to the bishop of poverty, he would say to them, "Keep bees! keep bees!" In this succinct advice—extending it to laity as well as clergy in rural districts—we heartily join, believing that in this country a ten-fold greater number of hives might be successfully kept than are now established.

In a very practical sense, the oft-repeated lines of Gray are strictly true :—

"Full many a flower is born to blush unseen,
And ~~waste~~ its sweetness on the desert air."

An apiary in the garden of every village clergyman would afford the means of economising this unclaimed bounty of Providence.

An amusing instance of the fondness of bears for honey is related by a Muscovite ambassador to Rome, in the "*Feminine Monarchie*; written out of Experience by Charles Butler. Printed in the Year 1609,"—a quaint, but sensible work :—

"A neighbour of mine (saith he), in searching in the woods for honey, slipped down into a great hollow tree, and there sunk into a lake of honey up to the breast; where—when he had stuck fast two days, calling and crying out in vain for help, because nobody in the meanwhile came nigh that solitary place—at length, when he was out of all hope of life, he was strangely delivered by the means of a great bear, which, coming thither about the same business that he did, and smelling the honey, stirred with his striving, clambered up to the top of the tree, and then began to lower himself down backwards into it. The man bethinking himself, and knowing that the worst was but death—which in that place he was sure of—beclipt the bear fast with both his hands about the loins, and withal made an outcry as loud as he could. The bear being thus suddenly affrighted, what with the handling and what with the noise, made up again with all speed possible. The man held, and the bear pulled, until, with main force, he had drawn him out of the mire; and then being let go, away he trots, more afear'd than hurt, leaving the smeared swain in joyful fear."

Bees may be very inexpensively and profitably kept in the cottager's hive (see page 80), which will be found a very productive one. It is true that it has not the

appliances of windows and bell-glasses ; for the cottager is not supposed so much to care for his hives as a source of amusement ; his object in bee-keeping is simply the profit it may bring. For those of our readers who wish to have united the facility of observing the bees with that of the plentiful production of honey, we would especially recommend the improved cottage hive, described at page 69. If inclined to go to a little further expense, the hives described at pages 51, 62, 77, and 84, all afford constant opportunity for inspection of the bees, and allow of their working freely in the most natural manner. The Stewarton hive (page 109) is also a favourite with those who give the preference to honey stored in boxes, although the opportunities for observation are not so great as with some others.

There are few hobbies which cost so little outlay as the keeping of bees. Once the "plant" of hives is purchased, there is little, if any, additional expense, and always a probability of a fair return. If honey be obtainable, the bees will find it ; they work for nothing, and provide themselves with sustenance, requiring only a very little labour from their keepers, and that labour of a pleasing and instructive kind.

To the advanced and skilful apiarian we would especially commend the use of the bar and frame hives. With these, as we have attempted to show, the bee-keeper has a full command over his hives and bees. Many mistakes, it is true, have been made by uninitiated

bee-keepers in using the more elaborate hives. Being struck with the remarkable facilities afforded by these superior hives for the extraction of any one comb, and, perhaps, fascinated with their easy sway over so highly-organized a community, these new-fangled bee-keepers have acquired a habit of perpetually and incautiously meddling with the bees. The inevitable results in such cases are, distress to the bees, impoverishment of the stocks, and loss and vexation to the over-zealous apiarian. All these things may be avoided, if it is remembered that there are first steps in bee-keeping, as well as in chemistry, croquet, or cricket. In bee-keeping, as in floriculture, it is a great point to know when to "let well alone." There is no florist, however anxious for a prize, who would be continually pulling up his plants to see how their roots were growing. Doubtless, the full control which the bars and frames afford over the inmost recesses of the hives is a great temptation to the bee-keeper; but if he yields too readily to it, he will imperil his chance of profit and deprive himself of that continuous source of interest which a judicious apiarian always enjoys.

Many persons who are well-informed on most subjects are extraordinarily ignorant of the natural history of bees and the economy of the bee-hive. Perhaps we might venture to suggest that more pains should be taken at schools, or by parents, to inform young persons on this, in connexion with kindred subjects. As an

amusing illustration of the ignorance referred to, we transcribe an order we received a short time since from a seminary in the north of England. The young gentleman thus writes :—"Master —— presents his compliments to Messrs. Neighbour, and begs they will send him a swarm of bees; he encloses *six postage stamps*, and hopes they will send him a *good* swarm." This embryo naturalist was evidently of a mercantile turn, and had a mind to buy in the cheapest market, for in a postscript he adds :—"Please let it be fourpence, if you can!" We need scarcely say that, in reply, we endeavoured to enlighten our juvenile correspondent as to what constituted a swarm of bees, and returned the stamps, with our thanks.

Much superstition has existed, and, in some quarters, still exists, among the poor respecting bees. If a death occurs in the family of the bee-owner, these superstitious folk consider it needful to make the bees aware of the bereavement by "waking" them; that is, by giving a few raps at the entrance, and audibly announcing the circumstance. If this be not done, "no luck," say they, will come of the bees the following season. Last summer, even near the metropolis, we heard a cottager bemoaning to his neighbour "his bad luck with his bees;" when the other replied, "Ah! no wonder; you never 'waked' your bees when your wife died; what can you expect if you omit such needful duty?" In many parts of France, as well as here, it is a custom on such occasions

to put the bees into mourning, by placing black crape or some such material round the hives. Bees also receive intelligence when a marriage or a christening takes place: in these cases, the hives are draped with red cloth. In fact, it is considered an essential element of "good luck" to inform the bees of any remarkable circumstance that occurs in the family of the bee-keeper. How would these good people manage with the newly-imported foreign bees, for they can hardly be expected to have learned our "lingo"? This difficulty is, however, not likely to be experienced, for it is to be hoped that intelligent bee-keepers do not believe in such nonsense. Fancy a man in this nineteenth century haranguing his bees after the above-mentioned fashion! Mr. Langstroth says that "some superstitious folk in America assert that the bees sometimes take the loss of their master so much to heart as to alight upon the coffin whenever it is exposed." A clergyman told him that he attended a funeral where, as soon as the coffin was brought from the house, the bees gathered on it so much as to excite alarm. Some years after this occurrence, being engaged in varnishing a table, the bees alighted upon it in such numbers as to convince the clergyman that love of the varnish on the outside, rather than any respect for the deceased within, was the occasion of their conduct at the funeral. Mr. Langstroth adds: "How many superstitions, believed even by intelligent persons, might be as easily explained, if it were possible to ascertain as fully all the

facts connected with them?" Another infatuation is, that you should on no account part with your bees for *silver* money—only for *gold*. This is so far sensible, that it ensures a respectable price. Certain credulous bee-keepers cannot, on any account, be induced to part with their bees for money; they will *barter*, but not *sell*,—to sell bees is, in their view, to lay themselves open to evil fortune. If these apprehensions are correct, our punishment will be a severe one, for we have been great offenders in that way, and seem likely to go on sinning.

It is scarcely necessary to add that, with the increase of education, such superstitions and fancies are becoming less and less, and will soon, it is hoped, be ranked amongst the follies of bygone days.

The culture of bees would be greatly promoted if a knowledge of it were considered necessary as one of the regular qualifications of a gardener. So little time is needed to gain the skill requisite for the tendance of an apiary, that it seems only reasonable to expect it of a well-taught gardener, and he should feel a pleasure in the circumstance of its forming a part of his duties. In Germany, where a country gentleman's table is kept constantly supplied with fresh honey, the gardeners are expected to understand the management of hives; and in Bavaria, modern bee-culture is taught in the colleges to all the horticultural students. Travellers in Switzerland will call to mind the almost invariable practice of

placing new honey on the breakfast tables at hotels in that country.

Some writers on bee-culture attach much importance to the particular position in which an apiary stands, and the aspect towards which it faces. A southern, or rather a south-eastern aspect, is the one which we have already recommended. Our reason for this preference is, that we deem it very important for the bees to have the first of the morning sun. Bees are early risers, and should have every inducement given them for the maintenance of so excellent a practice. A few years since, many strong opinions were expressed in favour of a northern aspect for hives. The chief reason given for those opinions, though very plausible, appears to us to be a very partial and inadequate one. It was said that, when the hives face the south, the bees may, like the incautious swallow in the fable, be tempted to fly abroad in the transient winter sunshine, and then perish in the freezing atmosphere when a passing cloud intervenes. But it is a very easy matter, if considered needful, to screen the entrance by fixing up matting so as to intercept the rays of the sun. At our own apiary we make no alteration in winter, under the belief that the bees will take care of themselves and that they seldom venture out when the weather is unsuitable.

With hives exposed in the open garden, it is a good practice to wind hay-bands round them in frosty weather, as such a protection enables the bees to resist the cold.

When a thaw occurs, everything, both in and out of doors, has a great deal of dampness about it. The combs of a hive are not exempt from this, so that it is advisable to have slight upward ventilation in winter. Holes the size of a pin's head allow of the escape of a good deal of bad air, which is generated by the exhalations of the bees, as well as by the dampness before referred to. These holes, being small, do not create sufficient draught through the hives to be pernicious ; if closed up by propolis, they are readily reopened with a pin. With wooden hives in winter, a bell-glass is often found to be useful ; it should be placed over the hole in the crown-board, with a zinc trough to receive the condensed moisture.

In summer, bees do much towards ventilating their own stock-hives. The observant apiarian will not fail to remark how, on a warm day, several of the little creatures will stand at the entrance, with their abdomens slightly raised and their twinkling wings in rapid motion, producing a current of air inwards ; while another set are engaged in like manner, driving the bad air out, so that a supply of pure oxygen is conveyed to the crowded inmates. In this fanning operation their wings vibrate with such rapidity, that their shape is as indistinct as are the spokes of a wheel when revolving in rapid centrifugal motion.

This important office entails great physical exertion on the part of the bees, and they relieve each other in detachments.

Fine colonies are sometimes destroyed by the entrance-way becoming stopped by some impediment or other, and care is requisite to keep a watch, that so fatal a catastrophe does not happen, because the bees (*unless where very ample ventilation is given*), excited by their imprisonment, make matters worse, by raising the temperature of their hive to such a pitch, that the combs melt from their foundations, and the bees themselves are suffocated, presenting, alas! a most woful spectacle to witness.

We give this hint because, having ourselves suffered from a similar cause when workmen have been employed in the vicinity of hives, these gentlemen, thoughtless of the welfare of the bees, but most careful of their own convenience, placed a piece of wood across, or otherwise stopped, the entrances, to prevent the bees coming out. In *summer weather* a very short time of confinement in a close hive suffices to complete the work of desolation; but should the bee-keeper's attention be drawn to such a state of things, he must immediately raise the hive from its floor-board, and let the poor bees have all the air possible, leaving them thus exposed for the purpose of affording them a chance of revival. When bees are likely to incommode those whose duties temporarily oblige them to be near the entrances, it is better to move the hives a few paces (for less loss will be experienced), or else let the workmen cover their faces with net. The foregoing remarks more parti-

cularly apply to the summer season. In winter or in the spring, when the weather is cool and the bees are not so numerous, hives may be shut up even for a day or so without much *ventilation*, and but little harm will arise therefrom.

When we send away stocks or swarms, we are always careful to pack them so as to allow of a full current of air, in order that they may travel even in the hottest weather.

Some bee-keepers find an adapting-board convenient for placing underneath straw supers, as it facilitates their removal. These boards are made of mahogany half an inch thick, with a hole in the centre corresponding with that in the stock-hive. We do not consider it necessary to fix cross sticks in the straw stock-hives, as is frequently done; but if the apiarian prefers to have his hives so furnished, there is no serious objection to it. These observations refer to our cottager's hive (page 80).

There is another little matter of detail that should be named here; that is, the necessity of the bee-keeper always having a common hive in readiness near the bees, so as to be able to secure any swarm which may unexpectedly start.

Here our pleasant task must close. We trust that all information has been given that is needful to enable the practical bee-keeper to begin business and the scientific apiarian to extend his observations. By way of

illustrating the two characters combined, we will quote another simple idyll, by the German bee-keeper, Herr Braun, whose winter musings we have already presented to the reader :—

ON THE FIRST FLIGHT OF BEES IN SPRING.

[From the German of ADALBERT BRAUN.]

BY "A DEVONSHIRE BEE-KEEPER."

Hark ! what is so gaily humming
In the little garden there ?
Hark ! what is so briskly whizzing
Through the still and silent air ?

Friend, it is our bees—the darlings—
Now enliven'd by the spring ;
Yes, the winter is departed,
And once more they're on the wing.

Happy he, who winter's perils
All his stocks brings safely through ;
Thank Him, of all good the Giver—
Faithful Watchman He, and true.

Of my own are none departed,
All as yet unhurt remain ;
Though no longer rich in honey,
Yet is spring returned again !

Come, and let us view them nearer—
Enter by the garden gate ;—
So—stand still and watch their doings—
Light your pipe, and patient wait.

See how busily they traverse
To their pasturage and back,
That they may by toil unwearied
Save the commonwealth from wrack.

Look, O look, what loads of pollen
Bring they in with heedful care.
Nurslings, fear not ; for your cravings
Here's sufficient and to spare.

How they dart and how they hurtle
Through the genial balmy air !
To the mountains—to the meadows—
'Tis the scent attracts them there.

There they dexterously rifle
Nectar from each flow'r in bloom.
Toil they for our honey-harvest,
' For us fill the honey-room.

Yes, our bees, our darling darlings,
We salute you all to-day ;
For your life is our enjoyment—
Winter's sleep has pass'd away.

Grant prosperity, O Heaven !
To the new-born honey-year—
Give thy favour—give thy blessing—
To these objects of our care.

Now let each attentive guardian
In devoted service strive
For the proud, the matron-monarch—
Sov'reign of the honey-hive.

So that we may learn by watching
Who that in the noon-tide glance,
Or in midnight's darkest moments,
Summons her to Hymen's dance.*

Ev'ry bee-hive calls for patience,
Whilst great Haller's lessons teach
Without patience Nature's secrets
None successfully can reach.

T. W. WOODBURY, *Mount Radford, Exeter.*

In conclusion, we would remind all bee-keepers who earnestly desire success, and who hope to draw pecuniary profit from their pursuit, of the golden rule in bee-keeping :—"Keep your stocks strong." In exercising the assiduous attention and persevering effort which that maxim enjoins, they will not only be regarded as *bee-keepers*, but, as Mr. Langstroth says, will acquire a right to the title of *bee-masters*.

* This point cannot now be considered doubtful, but it must be remembered that Herr Braun's verses were written twenty years ago.





APPENDIX.

TESTIMONIALS OF THE PRESS.

GREAT EXHIBITION, 1851.

THE "Working Apiary" in the Great Exhibition of 1851 will long live in the remembrance of the many thousand visitors who witnessed with much interest the matchless industry of its busy occupants.

We extract the following from many notices that appeared in the public journals relative thereto.

In noticing the hives exhibited in the Crystal Palace, I would say, first and foremost, in my opinion, stands Mr. Taylor's Eight-bar Hive and Messrs. Neighbour and Son's Improved Cottage Hive, both exhibited by Messrs. Neighbour.—*J. H. Payne, see "Cottage Gardener," Nos. 169, 170.*

From the "Illustrated London News."

Messrs. Neighbour's Apiary consists of a large glass case, with parts of the sides covered with perforated zinc for the sake

of ventilation. This apiary contains three hives : first, Neighbour's Ventilating Box-Hive, containing from 15,000 to 20,000 bees, which were hived on the 30th of April of the present year, the day before that of the opening of the Great Exhibition ; Neighbour's Observatory Glass-Hive, containing about the same number as the box-hive ; and a two-storied square box-hive, with sloping roof. From this latter, however, the bees decamped within a week after they had been hived, owing to some disturbance, or perhaps to the dislike taken by the bees to their new habitation. The Ventilating Box-Hive is in shape square, having windows and shutters. The entrance is at the back, enabling the bees to go to Kensington Gardens, or other resorts, when they please. Above the wooden box is placed a bell-glass, into which the bees ascend to work through a circular opening in the top of the square box. In the top of the bell-glass is an aperture, through which is inserted a tubular trunk of perforated zinc to take off the moisture from within. The Observatory Hive is of glass, with a superior crystal compartment, an opening being formed between the two ; the bees are at present forming a comb in this upper glass, which affords a very interesting sight, as, generally speaking, the bees are in such a cluster when at work, that one can scarcely view their mathematically-formed cells. A straw cover is suspended over the upper compartment by a rope over a pulley, which cover is raised up by the attendant at pleasure. The larger or bottom compartment rests on a wooden floor, which has a circular groove sinking therein to receive the bell-glass. A landing place projecting, as usual, with sunken way, to enable the bees to pass in and out of their habitation, completes this contrivance.

In addition to Mr. Neighbour's Crystal Apiary, he also exhibits a Cottager's Straw Hive, Taylor's Amateur Bee-Hive, a Glass Hive, Nutt's Patent Collateral Hive, the Ladies' Observatory Hive, Neighbour's Improved Cottage Hive, and Payne's Cottage Hive.

The Cottager's Hive is simply that of the form we find in use in most parts of the country, where the industrious cottagers or their wives, by a little attention to their interesting little labourers, are enabled to add something to their usually scanty earnings. This kind of hive is usually made of straw, resting on a circular wooden board, with part of the board or floor projecting in front as a landing-place for the bees, which enter under the edge of the straw by means of a sinking in the floor.

Taylor's Amateur's Bee-Hive consists of three small square boxes, one above another, with a roof over the top story, the ventilation being effected by perforations under the eaves; each side of every story has a window and shutter. The landing-place is in front of the bottom story, and the entrance to the hive is a long slit about three-quarters of an inch high.

The Glass Hive, or Ladies' Observatory Hive, is similar to that in which the bees are at work in Mr. Neighbour's Apiary already mentioned, but on account of the number of bees at work therein, and the extent of comb already effected, the interior perches cannot be seen. These wooden perches are arranged in parallel lines, leaving a space next the glass all round, the whole being framed together with a bar at right angles, and resting on an upright support in the middle.

The Improved Cottage Hive of the same exhibitor consists of a straw circular lower compartment, having windows and outside shutters. A thermometer is placed just inside one of the windows. The floor is of wood, with a landing-place and sunken way, as already mentioned in some of the other hives. In the top, which is also of wood, are three circular perforations, each of about two inches in diameter, above which are placed as many bell-glasses. There is a small hole in the top of each of the glasses, through which a perforated tubular trunk is inserted for the sake of taking off the moisture from the interior of the hive. Within the glass is a feeding-trough of zinc, circular in shape, with a floating perforated floor, on which the bees alight, and in the winter season regale them-

selves with the honey which is found in the various perforations, as it floats up to the level of the honey contained in the small filling-trough, through which the honey, or beer and sugar, is poured. The glasses are covered with a straw cap, removable at pleasure.

Messrs. Neighbour's contributions are completed with tin perforated fumigators, by the use of which the bees are stupefied for a while, when required to be moved from one hive to another, and specimens of honey and honeycomb of the season 1850.

From the "Express."

BEEES AND BEE-HIVES.—In the North-East Gallery, directly under the Transept, are arranged, by Messrs. Neighbour, of Holborn, several descriptions of bee-hives, which it will be interesting to many of our readers to examine, as this branch of rural economy is claiming much general and deserved attention throughout the country. The novelty of these hives consists in the facilities that are afforded in taking therefrom, at any time of the gathering season, the purest honey, without destroying or even injuring the bees, thus humanely superseding the barbarous and hateful system of murdering these interesting insects to obtain the produce of their industry.

Immediately adjoining the group of untenanted bee-hives may be observed living hives with the bees most industriously at work. These useful little creatures have been highly honoured by the Executive Committee, for of all the animal workers that contribute to the interest of the Exhibition, they alone are allowed therein to display their matchless ingenuity and skill. By a simple contrivance, the bees are allowed egress and ingress without in the least degree molesting the visitors, thus enabling the admirers of the works of nature to view the whole process of forming the cells and depositing the honey therein.

Within these few days, Messrs. Neighbour have added to the Apiary a bee-hive constructed entirely of glass, protected by a

cover neatly made of straw, but so contrived that on application to the attendant it can be removed instantly, thus illustrating more particularly the curious workmanship of these amusing insects.

Her Majesty the Queen and the Prince Consort, with the Royal Children, were some time engaged in watching with deep interest the busy scene before them, and putting many questions relating to the habits and economy of the honey-bee.

INTERNATIONAL EXHIBITION, 1862.

From the "Illustrated London News," August 16, 1862.

One of the most interesting and instructive objects in the Exhibition is a transparent hive, in which the bees may be seen at full work. Among the collection of bee-hives exhibited by Messrs. Neighbour and Son, is one of glass, stocked with a colony of Italian Alp bees. Here the queen-bee may be seen surrounded by her subjects, which pay the most deferential attention to their sovereign. Through an aperture cut in the wall, the busy throng of bees are continually passing and repassing. They go out at their pleasure into the open court, fly over the annexe into the grounds of the Horticultural Society and other adjacent gardens, and return laden with sweets.

From the "Journal of Horticulture," October 21, 1862.

G. Neighbour, and Sons, 149, Regent Street, and 127, Holborn, No. 2157, have a very handsome and complete stall, on ascending the steps of which we found a flourishing stock of Ligurians, apparently not at all ashamed of the public position which they occupied, and working vigorously in the full light of day. The queen, one of the largest and finest-coloured we have met with, was perambulating the combs and receiving the homage

of her subjects, stopping frequently to deposit an egg in every empty cell. The hive itself was a "Woodbury Unicomb," handsomely got up in mahogany, invented, as its name implies, by our valued correspondent, "A Devonshire Bee-keeper," the construction of which will be readily understood by an inspection of the engraving at page 102. Its distinctive features are the adaptation of the movable-bar system to unicomb-hives, by which any colony in an apiary of "Woodbury hives" can be placed in the unicomb-hive in a few minutes, and the use of "outside venetians," or "sun-blinds," as they are called, instead of the usual impervious shutters. By this contrivance light is never excluded, so that when the hive is open for inspection, all its inmates continue their avocations with their accustomed regularity, and a quiet and orderly scene is presented to the spectator, instead of the hubbub and confusion which ensues in ordinary unicomb-hives. On the left-hand side of the unicomb hangs a beautifully-executed drawing of a Ligurian queen-bee magnified, together with the queen-worker and drone of *Apis Ligustica*, of the natural size. Immediately under the drawing is placed a square glass super, containing nearly forty pounds of the finest honeycomb. On the right of the unicomb-hive is another super of the same description, containing nearly thirty pounds of the purest honey. These supers are, undoubtedly, by far the finest in the Exhibition, and are the first worked in England by Ligurian bees, being from the apiary of "A Devonshire Bee-keeper." In addition to these, the most striking objects, are shown Neighbour's Improved Single Box and Cottage Hives, Taylor's Bar-Hives, Woodbury Frame and Bar-hives, the new Bottle-feeder, and bee apparatus of every description. It will be apparent from the foregoing, that Messrs. Neighbour's stall is well worth inspection, although the various novelties it contains appear to have met with but scant appreciation by the Jury, who merely awarded to them that "honourable mention" so lavishly accorded to far less deserving objects.

From the "Illustrated News of the World," September 6, 1862.

One of the most interesting and instructive objects is the honey-bee at full work in transparent hives. In the International Exhibition, Class 9, Eastern Annexe, Messrs. Neighbour and Son of Holborn and Regent Street, exhibit, amongst a collection of the most approved bee hives and apparatus, a glass hive, stocked with a colony of Italian Alp bees. The hive is so constructed as to admit of easily seeing the queen surrounded by the working bees. Contrary to the long-established notion that the bees work only in the dark, this hive is completely open to broad daylight. The bees do not manifest the least dislike to the exposure, and they are not discomfited when light is occasionally admitted for inspecting them. It is obvious that a knowledge of this new feature must tend to a more general acquaintance with the habits and hidden mysteries of the bee than has hitherto been the case. The queen may be seen depositing the eggs in the cells; in this manner she goes on multiplying the species, the working-bees surrounding her, and paying the most deferential attention, with their heads always towards her. Not the least interesting part is to watch the entrance; facility is afforded for doing so, the sunken way communicating with the hive being covered with a flat piece of glass. The busy throng pass and repass through the aperture cut in the wall, so that the bees go out at their pleasure into the open court, fly over the Annexe into the Horticultural and other adjacent gardens, and return laden with crystal sweets gathered from the flowers. The novelty of being able to inspect living bees, and those of a new variety, as easily as goods in a shop window, will well repay the trouble of finding Messrs. Neighbour's stand. These gentlemen will no doubt cheerfully give any information that may be required.

*From the "Gardener's Weekly Magazine," September 1, 1862.
Conducted by Shirley Hibberd, Esq., F.R.H.S.*

Neighbour and Son, 149, Regent Street, London (2157).—

This is the most important of the exhibitions in this department. The "bees at work" are in hives open to the inspection of visitors, the bees passing out through tubes to the open air, and not being visible within the building, except through the glass of the hives. The collection of hives of all kinds is complete and interesting, and we subjoin a figure of the stand (see page 102) to show how bees as well as hives may be exhibited conveniently. Amongst the various contrivances exhibited by Messrs. Neighbour, Nutt's Collateral Hive has an important place, and though very fancifully got up, and therefore very attractive to amateur bee-keepers, we must make the same objection to it as we have above to other forms of the same from different makers. The Single-box Hive, the Taylor's Shallow Eight-bar Hive, are the best bee-boxes in this collection, and every way admirable. Here are no fancy ventilators which the bees will close up, nor provoking side boxes which they will hesitate to enter, and from which it will be hard to dislodge them in order to get them to winter in the "pavilion." Whoever begins bee-keeping with either of these will have a fair chance of success. The most popular of the hives is that called the "Improved Cottage." Its popularity, no doubt, is due to the compromise between wood and straw which it accomplishes. People cannot get rid of the idea that a bee-hive *must* be made of straw, though it is a material so ill-adapted for union of swarms, supering, and other operations of advanced bee-culture. The "Cottager's Hive" is well adapted for "those apiarians who are desirous of setting up their poorer neighbours in the way of keeping bees on the improved system." It consists of stock-hive, small super-hive, and straw cover, and is on the principle of Payne's, which has been most successful among country-people who have got so far as to prefer keeping to killing their bees. The "Woodbury Bar and Frame Hive" is a novel construction, combining all the best features of the best bar boxes, and adding some new ones of great value and importance. We recommend every bee-keeper to become possessed of this

admirable contrivance, with which Mr. Woodbury has accomplished wonderful things in the multiplication of the new race of Ligurian bees. In general form and proportions it resembles Taylor's and Tegetmeier's boxes, but in the arrangement of the bars it is unique. The stock-box is furnished with ten movable bars and frames, after the German plan. Each bar has a projection running along the under side; this ridge is chosen by the bees for the foundation of combs, rendering guide-combs unnecessary. The supers have glass sides and eight bars, so that the operator need never be in doubt when to add another box above, or take away the harvest.

The "Unicomb," or one-comb observatory hive, is intended solely for purposes of observation, and though furnished with doors to keep up a uniform degree of heat, Messrs. Neighbour have found in their experience at the Regent's Park Gardens and elsewhere, that the bees manifest no dislike to a continual exposure to light. As this elegant contrivance can be placed in the window of a drawing-room, it is adapted to the amusement and instruction of the family circle, as well as to the more serious objects of the entomologist and scientific apiarian. All that is necessary is to connect the outlet with the open air by means of a length of tubing or wooden tunnel, and the bees pass in and out without obtaining access to the room, and all the mysteries of the hive are open to daily observation. There are numerous other hives, bee-feeders, bee-armour, &c., &c., which we have not space to notice, but which we advise our apiarian friends to inspect, as the collection of Messrs. Neighbour illustrates fully every department of this interesting subject.

BATH AND WEST OF ENGLAND AGRICULTURAL
SHOW AT EXETER, IN JUNE, 1863.

From the "Journal of Horticulture," June 23, 1863.

A novel feature in the Exhibition of the Bath and West of England Agricultural Society, which took place at Exeter last week, was the stall of Messrs. Neighbour and Sons, in which were exhibited bees at work in glass hives, and apiarian appliances of every description. There were two Ligurian stocks of bees at full work, one in a full-sized Woodbury Unicomb Hive, having been brought from London for the occasion, and the other a smaller hive of the same description, being from the neighbouring apiary of our valued correspondent, "A Devonshire Bee-keeper." Amongst the hives exhibited, the Woodbury Frame Hive in straw appeared both novel and good, whilst amongst the apparatus, artificial combs, and the stereotyped plates for making them, seemed to us the most worthy of attention.

There was a remarkably curious specimen of artificial combs, or partition wall, partially fabricated into complete comb by the bees, which struck us as being well worth examination, showing, as it did, the various stages by which this transformation is effected, and being calculated to throw light on the problem as to the mode in which bees construct their combs. It is almost unnecessary to state that this unique and instructive stall was crowded throughout the week, and we hope its financial results were such as will lead Messrs. Neighbour to continue their attendance at the Society's meetings.

From the "Western Times," Exeter, June 12, 1863.

FOR THE LITTLE BUSY BEE.—Next to the poultry tents, and set back against the yard fencing, is the exhibition of

Messrs. George Neighbour and Sons, 127, High Holborn, and 149, Regent Street, London, inventors and manufacturers of improved bee-hives for taking honey without the destruction of the bees. The savage knows where to find the nest of the wild bee, and how to get at his honey; but all the improvement upon the covetousness of the savage made by the long after ages of the world to modern times, was to find the means of luring the pattern of industry to a convenient atelier, where he might be more easily first murdered and then robbed. Their habits early attracted the attention of some of the best observers of ancient as well as modern times. Cicero and Pliny tell of the philosopher Hyliscus quitting human society, and retiring to the desert to contemplate their peaceful industry. The ancient poet, in his *Sic vos vobis*, plaintively sings over bee and beast living, or rather dying, not for themselves, but the lord of creation, yet was it left to modern times—very modern times—to join the sentiment of humanity to the rapacity of the barbarian. Mr. Neighbour has a very complete collection of specimens of the ingenious and successful contrivances in the construction of hives for the double object of preserving the honey and the life of the bee, and also subsidiarily of promoting its comfort during its busy and useful life. We are not allowed to forget here that we have residing in our city one of the first apiarians in the kingdom—Mr. Thomas Woodbury, of Mount Radford. If the bee-philosophy be his hobby, we must recollect that all great discoveries and improvements owe their existence to men who had the power and the will to concentrate their faculties upon a single object. One proof of his genius in this his favourite department of action, is seen among this collection of Mr. Neighbour's, in the "Woodbury Unicomb Hive." It might be, when closed up, for aught that appears, a neat case of books; but on opening two doors of the Venetian blind pattern, back and front, we see between the glass walls the insect city exposed to view, with all the population in action. There it may be seen

“ How skilfully she builds her cell ;
How neat she spreads her wax ;
And labours hard to store it well
With the sweet food she makes.”

Some of the hives are constructed chiefly for the purpose of promoting a philosophic observation of the bee's habits and methods of procedure in his wonderful work. “ Neighbour's Unicomb Observatory Hive ” is a great novelty, being constructed with glass slides, the hidden mysteries of the hive being exposed to the full light of day. “ Huber's Book or Leaf Hive ” is constructed to facilitate the object of the scientific apiarian. But the class of hives which will most interest those desirous of promoting bee-keeping among the many will be those for the cottage. There can be no doubt that many a poor cottager in the country, if he could be made to see the advantage it would be to him, and were taught the most economical and successful way of managing this species of “ live stock,” would add thereby something considerable to his small earnings in the course of a summer. Members of Cottage Garden Societies have turned their attention to it very generally ; but to get the thing well afloat, requires in every district the devotion of some earnest enthusiast who will take up the apostolic rule of action “ This one thing I do.” There is the No. 5 “ Improved Cottage Hive,” in which three bell glasses are employed, enabling you to take a glass of the purest honey from the hive in the most vigorous period of the season. Then there are other hives of simpler construction and less expensive, but all illustrative of the sentiment of humanity which seeks to preserve from wanton destruction those useful and interesting auxiliaries to our luxury and comfort. This comparatively unimportant stand, in point of size, cannot but attract the attention of a large number of visitors, especially of the ladies and the clergy, who are desirous of promoting the cultivation of the bee among the poor. To heighten the interest for the curious, in

one of Mr. Woodbury's hives the bees are all alive and at it, and for those who are disposed to go further into the subject, information is available touching this fashionable, profitable, and domesticated member of the apiarian family, the Ligurian or Italian Alp bee. Our old dark-coated delver is threatened with supercession, just as the black rat was driven off by the Norwegian invader, now in possession,—as the old races of cattle are being metamorphosed in the sleek, shapely, beef-bearing, small-boned animals of the present time.

From the "Devon Weekly Times," June 12, 1863.

BEEs.—Messrs. Neighbour & Sons, of London, are exhibitors of two Woodbury Unicomb Hives, showing the royal and common bees in full work. These hives are very ingeniously constructed, and were invented by Mr. T. Woodbury, of Mount Radford. Among other apiarian attractions, we may mention the improved Cottage and Cottager's Hives, which are well worthy the notice of those for whom they are designed, and the Ladies' Observatory Hive. The Messrs. Neighbour also exhibit Ligurian bees.

From "Woolmer's Exeter Gazette," June 12, 1863.

IMPROVED BEE-HIVES.—At a stand near the poultry tents are exhibited Neighbour's Improved Bee-hives for the taking of honey without the destruction of bees. The hives are stocked with the famous Ligurian bee. The Unicomb Observatory Hive is constructed with glass sides, so that the whole of the movements of the Apiarian colony are visible, including the proceedings of the queen and her court. This and some of the other descriptions of hives manufactured by Messrs. Neighbour are invented by T. W. Woodbury, Esq. They are furnished with movable bars, after the German fashion. Each bar has a projection along the underside; this ridge being waxed, induces

the bees to build parallel combs, thus obviating the necessity for a guide-comb. This description of hive is best suited for the Ligurian or Italian Alp bee. Stocks of this species, now so much in repute, may be obtained of Messrs. Neighbour, 149, Regent Street, London.

ROYAL AGRICULTURAL SHOW,
NEWCASTLE, 1864.

From the "Northern Daily Express," July 22 (published at Newcastle).

A MODEL FACTORY.—Stand 194.—G. Neighbour and Sons, Regent Street, and High Holborn, London. We have heard of model farms and model lodging-houses for the working classes, but it was reserved for the Royal Agricultural Society's Meeting in 1864 to introduce to our notice a model factory, where we may see representatives of the working classes busily engaged in their daily avocations. The stand which we have quoted above may afford fruitful study to such philanthropists as the Earl of Shaftesbury, who make it their benevolent aim to elevate the masses, and the lesson here given from actual life will not be lost upon working men themselves. There are several striking features worthy of notice in the "model factory." We can clearly perceive that it has been established on a principle which is essential to the success of any great concern—namely, the principle of a good understanding amongst the operatives themselves, and between them and the head of the establishment. What strikes us in this model factory is the unity of action which reigns throughout. There is no jostling of rival interests, and no misunderstandings or cross purposes. The operatives in this establishment are so numerous that we question if any one has as yet been able to count their number, and yet all seem to be working in perfect harmony, their joint labour continually lead-

ing to one beautiful and sublime result. Another feature specially noticeable in the establishment in question is the principle of subordination. Singular to say, that while the operatives are males*, the foreman of this model factory is a female; but that circumstance need not shock the sensibilities of our fair friends any more than it ought to offend the prejudices of the sterner sex, inasmuch as the mighty empire of Great Britain is ruled by the gentle hand of a female; and moreover, in the one case as in the other, the presiding genius, amid all her official cares and duties, takes care to preserve the modesty of her sex. She never in the slightest degree obtrudes herself needlessly on public observation, and probably on that very account the respect shown to her by her subjects is the more profound and devoted. There is, however, one particular in which we would take leave to demur to the idea of this factory being in every respect regarded as a "model." We have not been able to discover that there is any particular period of the day in which the operatives are allowed to take refreshments. We, in England, have been accustomed to regard the dinner-hour somewhat in the light of a sacred institution. And if the Council of the Royal Agricultural Society mean to set this up as a model institution, we are of opinion that some explanation on this point is desirable. Indeed, we have not been able to discover that the operatives in this establishment take any refreshment whatever. If they do, it must be "on the sly," vulgarly speaking. There is one peculiarity, however, which must tend to popularize this institution, and which has served to make it one of the most attractive objects on the show ground. It is the fashion in all the great factories which abound on the banks of the Tyne and throughout the country generally to act on the principle of exclusiveness to a very great extent, and perhaps wisely so. As you approach the door you see an intimation in legible characters, "No admission except on business." This

* The reporter was in error as to the sex of the workers.

may be very proper, but it is rather tantalising. In the model factory which we are now describing all the operations are open to inspection. Every action is patent to the eye of the spectator. This has been effected by a skilful contrivance, and it is this contrivance, in fact, which has entitled the inventor to obtain a place in the show ground for his model factory, which he describes by the somewhat ambiguous term "a new implement." But our readers may wish to learn what is the staple manufacture of this wonderful workshop. We reply—"honey." The factory we speak of is nothing more nor less than a bee-hive; or, to quote from the catalogue, "An Unicomb Observatory Bee-hive," with living Italian Alpine bees at full work; it was invented by T. W. Woodbury, of Exeter, and is improved and manufactured by the exhibitors. As implied by its name, this hive has one comb, so that both sides are fully exposed to the light of day, thus allowing of an easy inspection of the queen-bee, surrounded by her retinue.

BEEES AND BEE-HIVES AT THE ROYAL AGRICULTURAL SOCIETY'S MEETING AT PLYMOUTH.

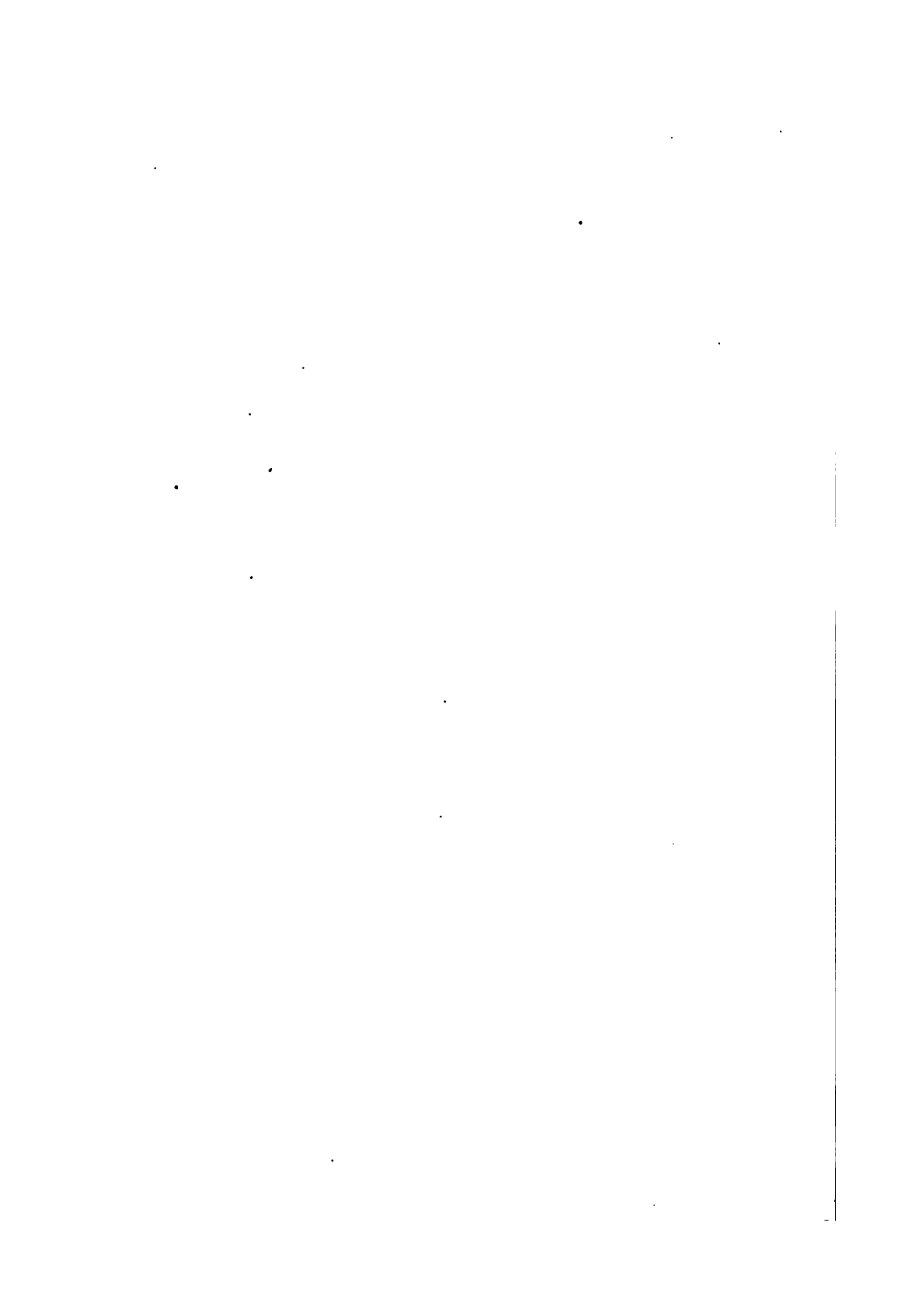
From the "Journal of Horticulture," August 22, 1865.

Living bees at work are always attractive, not only to bee-keepers, but to the general public. Messrs. Neighbour and Sons' exhibition formed no exception to this general rule, for their stand was at all times densely crowded. The chief object of interest was the Woodbury Unicomb Observatory Hive, in which was a stock of Ligurian bees, with a very fine queen surrounded by her yellow Italian subjects. Messrs. Neighbour also exhibited a square Woodbury glass hive stocked with English bees, in which the position of the bars and frames, with bees and combs,

could be very distinctly seen. Both these colonies were brought from Mr. A. Neighbour's apiary, near London. The bees obtained egress and ingress by means of a covered way nearly three feet long, which appeared but little to inconvenience them, whilst, being covered with glass, it added not a little to the interest with which they were observed. In the wall of the shed were small apertures, with alighting-boards fixed on the outside, and although the public passed in crowds before these unprotected entrances, no one was stung, nor were the bees themselves interfered with or molested—a warning notice appended to the outside being universally attended to, and a respectful distance maintained.

Amongst Messrs. Neighbour's collection were the Woodbury Straw Bar-and-Frame, Neighbour's Improved Cottage, the Ladies' Observatory, Cottager's, and many low-priced straw hives on the improved system. The impressed wax sheets, with specimens of combs partially worked therefrom, were interesting and curious. The bottle-feeder, bee-dresses, india-rubber gloves, and other apiarian appliances also received, and were worthy of, much attention.

By way of illustrating the fruits of the honey-harvest of the present year, Messrs. Neighbour had a square super of fine white honeycomb from the apiary of our esteemed correspondent, Mr. Woodbury, and an octagon glass super from our valued contributor, Mr. S. Bevan Fox, both of which admirable specimens were most highly commended.





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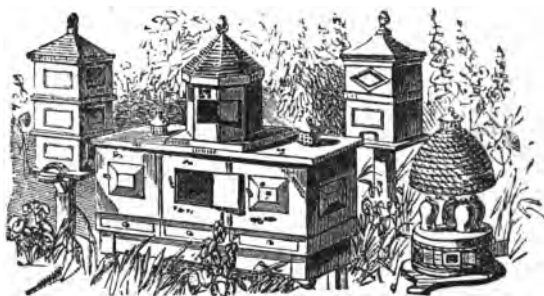
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